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Correct Bearing Maintenance May Save the Industry $3,000,000

MAINTAINING car bearings in operating condition, while one of the most essential jobs on a railway, is given little thought by any one outside the mechanical department. There are four or eight journal bearings on each car, and eight to sixteen motor bearings. With more than 100,000 electric railway cars this gives a total of more than 1,500,000 bearings in service. These are all expected to function perfectly at all times and under all conditions of load and weather. That they usually do so is a tribute to the skill of the designers and the men who maintain the cars.

Of course, bearings wear out in service and their periodical replacement is one of the routine jobs of car maintenance. Failures occur occasionally, and when they do the service is disrupted. Too much importance cannot be given to the inspection and maintenance of this humble device, so that repairs can be facilitated and road failures prevented.

The importance of the subject can be seen from the recent estimate of an engineer who states that the cost chargeable to motor bearings alone is annually some $6,000,000, and that half of this amount can be saved to the industry by better motor lubrication.

The survey on bearing practice, the first article of which appeared in the Aug. 16 issue of this paper, and the second appearing this week, points out some of the difficulties to be looked for and how they may be overcome. The present article shows the importance of correct methods of machining the bearings so as to obtain proper lubrication and so that they will fit properly. Both of these are essentials in keeping the car on the road instead of its being held in the shop.

Careful Fitting of Bearings Is Needed to Lengthen Their Life

AS SOON as a motor goes into service, wear starts between the armature shaft and the bearing lining, of which, incidentally, some 90 per cent is caused by foreign matter and dirt getting into the bearing. Apart from this normal wear, which can be determined with a certain degree of accuracy, the bolts which clamp the bearing in the motor shell frequently loosen, and wear then takes place on the outside of the bearing and on the inside of the frame fit. When loosening starts, it increases rapidly, due to the pounding action when the car operates over rough track, until the bearings get so loose that they become dangerous to operate. It is this looseness that is responsible for the greatest majority of bearing troubles and the short life obtained.

Trouble of this sort is most pronounced on the old split-frame motors of which there are still many in service, because railway managements feel that the expense of purchasing new ones is not justified. Although these motors are heavy they will operate satisfactorily and will stand heavy overloads under extremely trying conditions of service, provided they are maintained properly.

The problem of keeping the bearings of such motors in condition is difficult. A solution for much of the trouble, as disclosed in the survey of bearing practice, has been found by some roads where precautions are taken to insure a tight fit of the bearings in the motor shells and where careful attention is given to fitting each bearing to the shaft on which it operates.

Good results have been obtained on some railway properties by welding these bearing fits and reboring the motor frames. Where shops are properly equipped to handle this work, the cost of welding and boring does not exceed the cost of a new set of bearings. An additional advantage is obtained where the motors originally had cast-iron babbitted bearings, as the bearing fits can be filled in and rebored to a smaller diameter so that a standard type of bronze bearing can be used. By this method some roads have obtained reduction in bearing weights of from 50 to 60 per cent.

This class of work can be carried out on small railway properties quite as well as on larger systems and will produce surprisingly good results. The argument sometimes used that while a practice is all right for the big roads the little ones cannot follow it does not apply here. With such possibilities, the practice is well worth giving a thorough trial.

Car Brakes Can Be Improved

MUCH thought is being given these days to the improvement of car equipment for electric railway service. Efforts which at first were directed almost entirely toward reductions in weight and operating cost have subsequently included serious consideration of the merchandising aspects of the design. In the attempt to make electric railway cars more attractive to the rider, noise reduction, ease of riding, seat comfort, appearance, smooth starting and stopping, have all been given increased attention, and progress has been made in improving cars along these lines.

One important part of the car equipment which has apparently received little general consideration is the brake system. There seems to be excellent possibility for improvements in the present type of brakes that would reduce weight and maintenance cost and would at the same time improve the design from a ride merchandising standpoint.

On most cars, at present, the braking force is transmitted from a single brake cylinder to the brakeshoes through an expensive, noisy and heavy system of levers and rods. Developments in hydraulic and pneumatic automotive brakes have pointed the way toward simplification of this design.

Some simple adaptation of the diaphragm or cylinder constructions which have been developed for automotive air brakes might be applied to an axle-mounted drum on electric railway cars. Such a construction would substitute air piping direct to the brake diaphragms for the present cumbersome mechanical transmission system represented by the foundation brake rigging. It has even been suggested that the brake diaphragms might be mounted directly on the motor case and the drum be carried on an extension of the armature shaft so as to take advantage of the increased leverage obtainable through the motor gearing. For single-end equipment, this would give more uniform wear on both sides of pinion and gear teeth.

Of course space limitations will be encountered on some of the larger and heavier types of cars. Again there will be the necessity for some form of flexible connection at the trucks in the brake piping on double-truck cars. However, these difficulties do not appear insurmountable. Flexible brake pipe connections between cars are successfully used in train operation. Limitations of space might make it necessary on certain cars to apply the brakeshoes to the treads of the wheels as at present. If there is sufficient advantage in taking the brakeshoes off the wheel treads to justify it, the possibilities of specially designed wheel hubs to take the shoes have by no means been exhausted.

There are many more reasons for considering this subject of brake improvement than can be given in a brief discussion. Reduction in noise and rattle, better equalization of pressure, elimination of weight and expensive maintenance of levers and pins are only a few of the advantages to be derived. The advantages of low car floors from a merchandising and safety standpoint have been generally accepted. The problem of getting sufficient clearance for the present type of brake pull rod presents a serious limitation in reducing these floor heights. On some center-door cars it has been necessary to use two brake cylinders to get clearance for pull rods. This difficulty would be all eliminated by piping the air directly to brake cylinders or diaphragms mounted at the point of application of the shoes.

Undoubtedly the advantages to be derived from elimination of the foundation rigging more than justify careful study and experiment. This will require co-operation between the manufacturers and some of the larger operating companies.

Why Not Give Private Companies the Same Advantages?

WHEN explaining how the city of New York could operate rapid transit lines at a profit on a 5-cent fare, provided it had some of its own to operate, Commissioner Delaney, head of the City Transportation Bureau created as a part of the home rule law passed at the last session of the State Legislature, is reported to have said that the city would have a decided advantage because no income nor franchise taxes would have to be paid, and money could be borrowed at 4½ per cent instead of 6 per cent. Is this admission a sign that the municipal authorities have seen a great light? One would have supposed from the past remarks of Mayor Hylan and his supporters on the subject of transit that inefficient management and the desire for exorbitant profits were the only reasons that the private companies could not operate satisfactorily on a 5-cent fare. Now it appears that the city authorities realize how heavy the tax burden of the railways really is.

If the Mayor of New York is genuinely anxious to give the people good transportation for a nickel fare, he might begin by advocating the abolition of the franchise and other taxes now collected from the private companies. They would then share with the proposed municipal system the advantages of which Mr. Delaney speaks. Of course, there would not be any true economy in such a scheme. Still more of the present cost of operation would be shifted from the car rider to the taxpayer, for it is a well-known fact that the interest on the city's subway investment is not being earned in full by the operating companies, but the deficit is being made up by general taxation. But Mr. Delaney admits that that is what the city would do if it had its own lines. Why not do it now without waiting for the completion of proposed routes whose construction has not yet been begun?

Boston Wage Award Forces Fare Increase

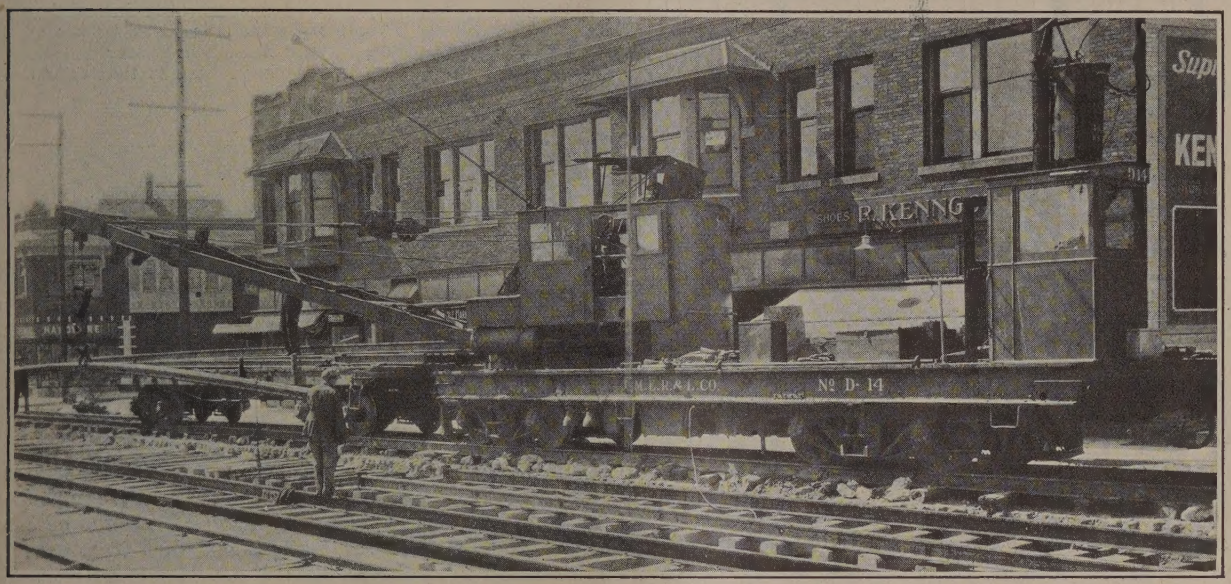
FARES on the so-called community lines of the Boston Elevated Railway, patronized by a million people last year, will go to from 5 cents to 6 cents on Nov. 1. This is the first and immediate effect of the arbitration award under which the men have just been granted an increase in wages of 2½ cents an hour at a cost to the company estimated at $500,000 for this year. Moreover, there may be a curtailment in the number of 6-cent routes. There most certainly will be more one-man cars.

In the face of the facts it is impossible to agree with the finding of the majority of the board. Again the plea is advanced that the wages to be paid to the employees in Boston should be entirely independent of the prosperity of the enterprise. In discussing the influence of public control on the rate of wages, Mr. Mulcahy, arbitrator for the company, has aptly said that the public should not be permitted to assert its interest against a particular group to deprive that group of a minimum fair living wage, but that after this minimum had been exceeded it was in the interest of every one concerned, not the least of all the employees themselves, that the wage award might not cripple the industry or unduly restrict it in the performance of its service.

As the Boston *Post* sees it, "there can be no serious complaint on the part of the public to the increase," but this expression of opinion was rendered before it had been established as a fact that fares would have to be raised. It would seem that the car riders, many of whom are not nearly so well paid as the trainmen, would be much more likely to agree with the opinion expressed by the Boston *Transcript* and sympathize with the argument of the minority report rather than that of the majority, particularly as the men were granted a 15 per cent increase only last year. In this particular case both the user and the non-user of the system pay, because under the public control act the deficits are made up by proportional assessments against the local communities and these advances are returned only if the earnings of the company permit. Fear was expressed in an editorial in the ELECTRIC RAILWAY JOURNAL for Sept. 13 that this fact might again be used to increase the wages of a favored group of employees. In the present instance this is just what has been done.

Work Train Employees Share in Profits

Utility Division of Way and Structures Department of the Milwaukee Electric Railway & Light Company Provides a Bonus Each Month for Workmen's Efficiency—Work Done for All Departments Is Credited at Predetermined Rates, and Cost of Operation Is Then Deducted to Determine Net Return



Service Trains of the Milwaukee Electric Railway & Light Company Do Work for the Way and Structures Department at Predetermined Rates

AS AN incentive to increase the number of ton-miles of materials hauled per hour of active duty for each piece of equipment and to improve the efficiency of the workmen the utility division of the way and structures department of the Milwaukee Electric Railway & Light Company has inaugurated a profit-sharing plan whereby all employees of this division receive a bonus each month that the division shows a "profit" on its operation. The bonus to employees represents 40 per cent of the net return after deducting the total expenses of the division from the total output credited at predetermined rates for utility service rendered to all departments of the railway.

Before a fair bonus plan could be put in operation it was necessary to place the work of the utility division upon a business basis. The first step in this direction was the classification of work. Utility service is the transportation of material for the construction, operation and maintenance work of the entire company. The operation of sand, salt, sprinkler and money cars, locomotives and snow-fighting equipment, line cars, etc., which is controlled by other departments than the way and structures, does not enter into the bonus plan. Work train equipment operated by the way and structures department under the "Utility Special Account" consists of motor and derrick cars, Differential side dump motor cars, Koppel center dump trailers, Differential side dump trailers, double-truck flat cars and single-truck flat cars.

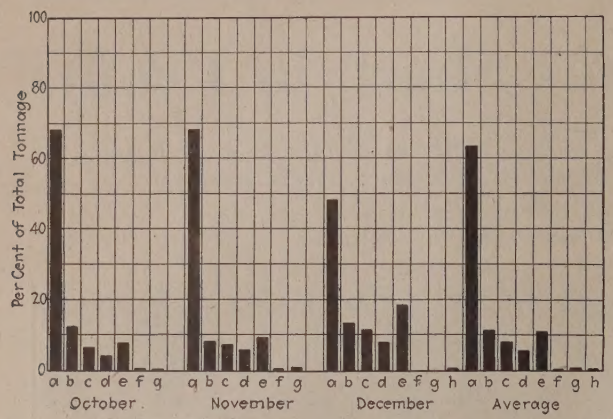
This utility service is available to all the departments of the railway, but as it was found that the way and structures department made more use of the service than did any other department it was deemed advisable to make the utility division a part of it. Chart 1 shows the distribution of work performed by the utility division for the various departments.

How the Plan Works

Orders for the transportation of material are received at the office of the utility division located in the way and structures department material yard. They are then classified and the trains dispatched. Ordinary shipments require one day's notice, but in special cases arrangements can be made on shorter notice. After a motorman receives his orders and leaves for his trip, he keeps in touch with the utility office, calling in for orders over the company's telephone system. A utility service delivery order and freight bill is filled out in quadruplicate by the motorman operating each train assigned to this work. It contains spaces for all necessary information relative to the shipment. The motorman fills out only the names of the sending and receiving points, date, weight, description of material and department for which the work was done. One copy goes to the foreman on the job and two copies—the original and a carbon—to the way and structures department office. The remaining copy is retained in the motorman's order book.

The two copies sent to the way and structures department are forwarded to the accounting department, where the remaining blank spaces are filled in with the rates and price of the job. The job order or work order to which the job is to be charged are also noted on this form.

In addition to routing the utility trains, the office of the division also keeps a daily record of the hours



Way and Structures Department Makes Greatest Use of the Utility Service

a. Way and structures.
b. Transportation.
c. Rolling stock.
d. Electric distribution.
e. Power plant.
f. Purchasing.
g. Lakeside.
h. Miscellaneous

each piece of utility equipment is in use. The information is obtained from the motormen's order books, in which are the copies of all delivery orders filled by them each day. This sheet is arranged so that every detail on the order sheets may be tabulated. As will be seen in the accompanying illustration the headings across the top of the sheet are such as to facilitate the work of the clerk as much as possible. The motor car numbers are listed vertically and the information filled in opposite the number of the car which was used for the particular job. A monthly summary of the daily reports is compiled by the utility division, showing the complete figures on the motor and trailer equipment.

For the purpose of simplifying the accounting work and to determine the rates, materials which are handled have been divided into three general classes:

Class "A" Materials.

All materials (except Class "C" materials) which can be handled in bulk in dump cars, such as:

Cinders (power plant)	Rejection gravel
Coal	Sand (in bulk)
Gravel	Asphalt
Crushed stone	Paving blocks
Screenings	Etc.

Class "B" Materials.

All materials and shipments not specifically included in Class "A" or Class "C" materials. Including ties, tie plates, sewer pipe, cement, poles, track tools, cable, car wheels, axles, conduit, stone dust and package freight that cannot be dumped.

Class "C" Materials (Special).

Coke.
Ashes from car stations.
Dirt from construction work.

After classifying the material hauled, it was necessary to determine the proper rates for each classification. This was first accomplished by determining the number of hours the equipment is used per year and the number of ton-miles hauled and dividing the special accounts covering the expenses of the utility service by these figures.

In this manner two sets of rates were established, one based on a ton-mile haul and the other on an hourly basis for equipment with or without crew. The ton-mile rates for the above classification of material hauled vary from 2½ cents to 31¼ cents, depending upon the character and volume of the material. In the case of ashes hauled from car stations and dirt from construction work, which are carried at a rate of 2½ cents per ton-mile, an allowance of only 1½ hours per round trip is included in this rate for loading and unloading. Any additional time required per trip is charged for at the regular car-hour rate.

Daily Utility Service Report—Way and Structures Dept.

Date

MOTOR MAN'S NO.	MOTOR CAR NO.	TRAILER EQUIPMENT							TRIPS								REMARKS
		F 201 TO 218	F 1 TO 29	F 30 TO 145	E 51 TO 56	E 61 TO 76	E 101 TO 110	E 8 TO 29	NO MEN	ACTUAL MILES	MOTOR CAR HOURS	LOCATION FROM	LOCATION TO	MATERIAL HANDLED	NO. MEN	ACTUAL MILES	MOTOR CAR HOURS	LOCATION FROM	LOCATION TO	MATERIAL HAULED	
	D 1																				
	D 2																				
	L 3																				
	D 4																				
	D 5																				
	D 6																				
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Form 2224—5,23—500 DUPLICATE

The Milwaukee Electric Railway and Light Company
UTILITY SERVICE DELIVERY ORDER AND FREIGHT BILL

No. 247613

6/6 19—

*Shipped From Ogden Ave *Shipped To Oak fill *For Way Department

*Include with Shipment on Orders *Total Weight 99000

*CHARGE ACCOUNT	*ARTICLES TRANSPORTED	CLASS	*WEIGHT POUNDS	*WEIGHT TONS	DISTANCE TARIFF	TARIFF TON MILES	RATE	AMOUNT
979 45	45 yds of dirt	C	99000	49.5	10	495	2½	9 90

UTILITY EQUIPMENT FURNISHED

	NUMBER CARS	ACTUAL TON MILES	CAR HOURS	ACTUAL CAR MILES	RATE PER CAR HOUR	RATE PER CAR MILE	
Double Truck Utility Motors	0	198	11	8	86		3 60
Double Truck Flats							
Single Truck Flats and Dumps	Left						
Double Truck Line Cars			1	8	85		3 40
Single Truck Line Cars							1 25

Rate Correction 25% — 2 10 15

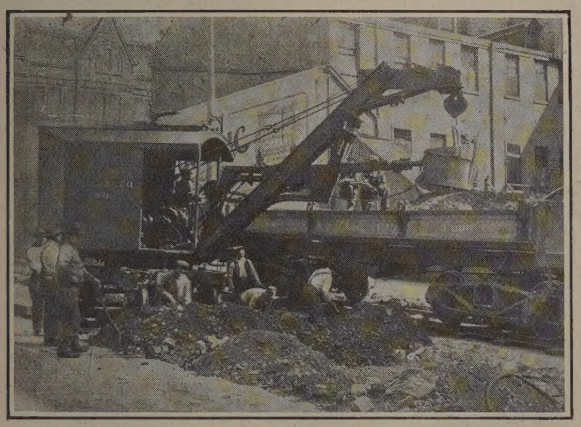
*Ordered by Thay Department Delivered by Noyzekerwska MOTORMAN Received by Correct FREIGHT CLERK

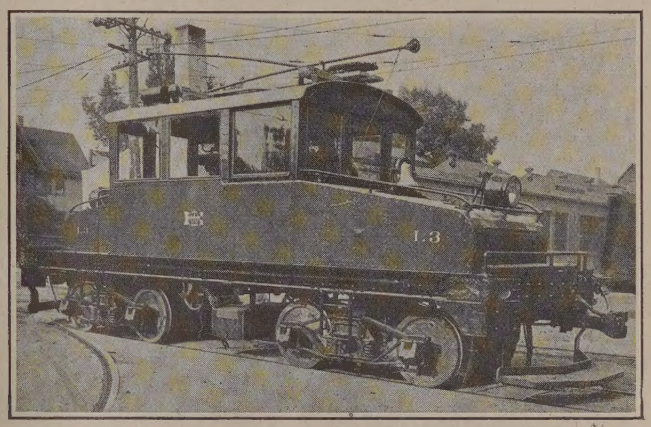
IMPORTANT—TO BE FILLED OUT BY SHIPPER. A SEPARATE UTILITY ORDER SHOULD BE MADE OUT FOR EACH CHARGE ACCOUNT AND IN CASE OF WORK ORDERS FOR EACH SUB CHARGE UTILITY ORDERS SHOULD NOT BE DESTROYED. IF VOIDED SAME SHOULD BE FORWARDED TO THE ACCOUNTING DEPARTMENT. THIS UTILITY ORDER WILL NOT BE HONORED BY THE WAY & STRUCTURES DEPARTMENT UNLESS ALL THE INFORMATION CALLED FOR IS PROPERLY FILLED OUT.

Duplicate Should Be Retained By the Way & Structures Department After Delivery Is Made.

Forms Used by the Utility Division Show Details of Work Done by Each Piece of Equipment

These car-hour rates have been computed from the various expenses itemized in the special accounts with the exception of labor. The latter item has been computed separately so that it is possible to establish rates for the use of equipment with or without crews. Having the total of all charges on a piece of equipment, a "use factor" is introduced by which it is possible to figure the hourly rate. This factor represents the percentage of use per day, for the previous year, using 24 hours as the length of a day. Utility equipment is charged for on an hourly basis only under the following conditions: (1) When it is necessary to make emergency partial trainload shipments; (2) when equipment is required for diversified use, such as moving work gangs, moving tools and cleaning up débris; (3) when equipment is used for special purposes such as switching freight, etc.





Left—A Single-Truck Electric Shovel Is Part of the Utility Division Equipment.
Right—Freight Switching Is Done by Electric Locomotives of This Type

The expenses for utility service are divided into two classes—operating expenses and fixed charges. Under the first are included superintendence, operating labor, miscellaneous supplies and expenses, power, light and heat, maintenance of equipment, maintenance of buildings, fixtures and grounds. The second classification represents the fixed charges, which are divided as follows: Injuries and damage, insurance, depreciation and taxes.

The rates have been fixed on such a basis that ample return may be obtained from the present operation of the equipment, and with the existing possibilities of reducing the expenses an opportunity is presented to increase the bonus. Certain expenses exist over which the operating employees of the utility division have no direct control, such as the unit maintenance cost. These are corrected periodically to allow for changing costs. The bonus paid to employees amounts to 40 per cent of the gross profits earned by the operation of the utility division. This sum is distributed according to the participating wages of the various employees. In this plan, as in other bonus plans of this company, participating wages are limited to $200 per month. This limitation, however, applies only to supervisory employees. The bonus is paid for each month that the division shows a profit. On the other hand, the employees' wages are not reduced if there is a loss resulting from the operation, but they receive no bonus.

Fixed charges are included in the bonus computations because they are necessary to arrive at the true profit. These charges are taken as 6.5 per cent of the valuation and consist of 3.5 per cent for depreciation, 2 per cent for taxes and 1 per cent for insurance. Inclusion of these items discourages securing unnecessary equipment, because such equipment increases the valuation without producing a corresponding increase in the revenues. The actual valuation of the utility equipment is $390,854. The percentage for depreciation has been made so as to correspond closely to the actual life of the equipment. Figures approved by the Wisconsin Railroad Commission gave the life of the car bodies and trucks as 25 years and that of motors from 15 to 20 years. Based on these figures the rate of 3.5 per cent has been adopted.

In ordinary calculations of this nature the fixed charges do not vary from month to month, except as the value of the equipment changes. If a flat monthly rate were followed in this plan it would create a heavy expense in the winter, in proportion to the amount of work done, and would almost prohibit the earning of a bonus during this season. For this reason, the annual fixed charges have been so distributed that they follow the trend of the revenue. Thus they are higher in the summer than during the winter because a greater amount of work is done by the division during the summer. This varying fixed charge aids the employees in earning a profit in slack seasons. The variable percentages which are applied to the fixed charges in order to determine the charge for each month of the year are calculated in Table I. They are arranged so as to vary in the same ratio as the revenues.

An example showing the operation of the bonus system for a six months period is given in Table II. From the table it will be seen that during the six months period the revenues exceeded the expenses for each month. Therefore each month the employees received a bonus amounting to 40 per cent of the profit made the preceding month. In computing the profits for a month, the bonus which is paid during that month for the efficient operation in the previous month is included in the expenses. Every month an analysis is made of the special accounts showing the amount of expense chargeable to each item and the amount of output or credit received. As a part of this report a comparison is made between the figures for the current month and those for the same month a year ago. Another interesting feature of this report is the statement of profit or loss for the month and also a year ago and in addition the cumulated profit or loss for the present year to date compared with a similar period a year ago. This analysis for June, 1924, is shown in Table III.

TABLE I—DETERMINATION OF VARIOUS PER CENTS FOR THE FIXED CHARGES FOR MILWAUKEE UTILITY SERVICE

Month	1918	1919	1920	1921	1922	Total	Per Cent of Total	Apportionment of Fixed Charges, per Cent: Actual	Apportionment of Fixed Charges, per Cent: Adjusted to Smooth Curve
January	$5,214	$4,698	$7,154	$5,226	$4,655	$26,947	3.82	0.25	0.33
February	17,912	3,566	4,790	8,048	5,848	40,164	5.69	0.37	0.29
March	4,850	4,484	8,115	7,595	5,581	30,625	4.34	0.28	0.29
April	5,390	6,993	10,561	8,429	6,238	37,611	5.33	0.34	0.37
May	6,129	13,044	11,000	16,226	14,882	61,281	8.69	0.56	0.52
June	7,112	15,455	9,478	18,236	13,825	64,106	9.09	0.59	0.61
July	7,260	11,991	19,284	21,511	16,691	76,737	10.88	0.71	0.67
August	12,197	13,261	15,835	13,464	22,089	76,846	10.90	0.71	0.72
September	5,972	15,761	15,092	15,081	24,143	76,049	10.78	0.70	0.74
October	12,570	15,481	19,057	14,863	20,102	82,073	11.64	0.76	0.74
November	6,350	24,327	15,848	12,221	18,038	76,784	10.89	0.71	0.69
December	5,207	19,457	12,783	6,301	12,335	56,083	7.95	0.52	0.53
Total	$96,163	$148,518	$148,997	$147,201	$164,427	$705,306	100.00	6.50	6.50

NOTE.—All output figures used above have been computed to the same basis of rates.

Possibilities of effecting savings in the total wages in the miscellaneous supplies and expenses and in the maintenance expenses are obvious. Means of reducing the power costs and the fixed charges are as follows: The power costs, while now obtained through the use of meters on the motor cars, were formerly determined from the car mileage. Separate standards of power consumption per motor car-mile, per double-truck trailer car-mile and per single-truck trailer car-mile were established. These were used in determining the power consumption. The employees may reduce this consumption per day by increasing loads and eliminating empty operation. With the installation of meters on motor cars, further savings can also be made by the economical use of power.

One item of the fixed charges which offers a chance for savings is that of injuries and damages. These include accidents and damages to persons or property. For the year 1923 these have been taken as 10 per cent of the revenue in place of the actual expenditures. This is done in order to avoid excessive fluctuations in the profits whenever large settlements are made. The ratio of 10 per cent represents approximately the amount of these expenses during 1922 and is revised at the close of each year to represent the amount actually expended during the year. For the year 1924 the figure is 8.62 per cent, this being lower than that used during 1923, mainly because of the greater output of the division during the past year. It is the object of every employee to reduce accidents in order to secure a low rate for each ensuing year.

Because of the utilization of the utility rates for bonus purposes, careful correction is made for changes in the actual costs due to conditions not under the control of the employees. The most important of these are changes in the wage rates of the direct labor and in the unit maintenance costs. The percentage increase in utility rates is computed by multiplying the increase in the wage rate by the percentage the total wages, exclusive of the bonus, is of the total expenses. The unit maintenance costs depend largely upon the wage rates in effect in the rolling stock department and upon the material costs. As the entire cost of the maintenance of equipment is but 13.33 per cent of the total expenses, it is not advisable to construct a complicated index for correcting material costs. It is sufficiently accurate to assume that the material costs vary in the same ratio as wage rates of that department. The utility rate correction for changes in the unit maintenance costs is computed in the same manner as is the correction for changes in direct labor wages.

This plan to decrease unit costs, besides exerting a very strong influence to curb the expenditures, aids the employee to see operating conditions from the standpoint of his employer and enables him to grasp the fundamental law of profit sharing, namely, that profits can be shared only after they have been earned.

Even with correction of rates and adjustment of costs the bonus earnings under this plan have continued to rise. One reason for this is that in the past no urgent incentive has been offered to increase the output per hour of active duty for each piece of equipment or to decrease the time of empty travel. Employees as a rule are not interested in the number of pieces of equipment owned or in how many of them stand idle on the storage tracks. They do not realize that every hour of labor which does not produce causes the expenses to rise without a corresponding return.

TABLE III—ANALYSIS OF SPECIAL ACCOUNTS, JUNE, 1924, COMPARED WITH JUNE, 1923, MILWAUKEE UTILITY SERVICE, WAY AND STRUCTURES DEPARTMENT

Accounts	June, 1924: Amount	June, 1924: Per Cent of Cost	June, 1923: Amount	June, 1923: Per Cent of Cost
Superintendence	$431	3.19	$438	2.94
Operating labor	6,949	51.45	7,121	47.82
Miscellaneous supplies and expenses	16	0.12	115	.77
Power, light and heat	1,046	7.74	933	6.27
Maintenance of equipment	1,778	13.16	2,618	17.58
Maintenance of buildings, fixtures and grounds				
Fixed charges*	3,287	24.34	3,667	24.62
	$13,507	100.00	$14,892	100.00
Profit for month of June	3,286	24.33	1,599	9.69
Profit for year to end of June	$16,793	4.87	$16,491	3.28
Credit for Work Performed:				
Charged to company	$16,774		$16,350	
Charged to outsiders	19		141	
	$16,793		$16,491	

* Injuries and damages, 10 per cent of output; insurance, 1 per cent; depreciation, 3.5 per cent; taxes, 2 per cent; total, 6.5 per cent on valuation.

TABLE II—OPERATION OF THE UTILITY DIVISION PROFIT-SHARING PLAN, YEAR 1923

	April	May	June	July	August	September	Total
Total wages, exclusive of bonus	$5,754	$6,988	$6,893	$6,132	$6,093	$6,154	$38,014
Bonus paid during month		816	666	412	587	635	3,115
Miscellaneous supplies and expenses	74	102	115	109	105	102	607
Power, light and heat	979	2,112	2,224	1,974	1,863	1,922	11,074
Maintenance of equipment	3,171	3,357	2,618	2,389	1,749	1,408	14,692
Maintenance of buildings, fixtures and grounds							
Injuries and damages (10 per cent of output)	1,674	1,912	1,457	1,999	1,653	1,235	9,931
Fixed charges (6.5 per cent of valuation per year)	1,436	2,018	2,368	2,601	2,795	2,872	14,090
Total expenses	$13,088	$17,305	$16,341	$15,616	$14,845	$14,328	$91,523
Utility output	15,231	19,120	17,452	17,113	16,532	15,019	100,467
Profit	2,143	1,815	1,111	1,497	1,687	691	8,944
Bonus (40 per cent of profit)	857	726	444	599	675	276	3,577
Bonus in per cent of wages	14.90	10.39	6.44	9.76	11.07	4.49	9.41

Survey of Armature, Axle and Journal Bearing Practice

Second Article

Machining, Cutting Oil Grooves and Finishing Railway Car and Motor Bearings —Clearances and Methods of Fitting Discussed—Building Up Worn Housings and Bearing Flanges — Proper Thickness of Babbitt in Finished Bearings — Recommended Allowances for Pressing and Precautions to Insure Tight Fits

THIS article, the second on the subject of bearing maintenance, deals with methods employed for machining the bearings, cutting oil grooves, and other work necessary to produce a finished bearing, together with the precautions which are used by electric railways when reinstalling the bearings in cars to insure that proper fits are obtained so that adequate service will result. Information for this analysis was obtained from a survey of the armature axle and journal bearing practice, as found by personal visits by the editors to 20 electric railways.

The first article on this subject, published in the Aug. 16, 1924, issue of ELECTRIC RAILWAY JOURNAL, contained an analysis of practices used by the same 20 railways. Information was given as to the types of bearings favored, the methods used to determine wear, practice in taking the bearings from the cars, the removal of old babbitt metal from the bearings, equipment and methods used in cleaning and tinning the shells and otherwise preparing them for rebabbitting, the compositions of babbitt metal used, and the precautions that are necessary while pouring the babbitt and preparing the mandrels for use.

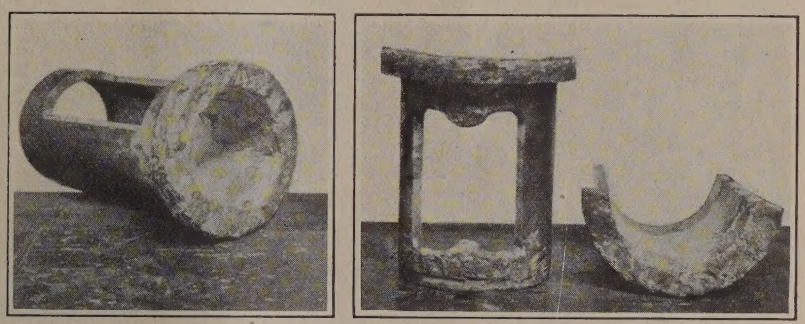
The bearing most commonly used on electric railway rolling stock consists of a shell of bronze or malleable iron lined with babbitt. There is, however, a decided tendency away from the babbitt lining for armature bearings. Motor manufacturers are now furnishing a bronze type of bearing with thin tin lining almost entirely with their new motors.

In the fitting of new bearings, it is necessary to machine both the outside and the inside, since the bearing itself must fit into a motor shell or housing, as well as provide an accurate inside fit with the shaft or journal. The ideal with regard to the inside fit is to provide enough clearance to allow a thin film of oil to form between the stationary and rotating parts so that the supported part actually will float on it. Running friction will then be reduced to a minimum, and while the film exists no wear of the metal surfaces can take place. In addition to giving the correct clearance it is necessary to provide oil grooves in order to keep the film of oil constantly in the bearings during rotation. Dirt and water must also be kept out or excessive wear will result.

The average finished thicknesses of babbitt required in babbitted bearings was found to vary from $\frac{1}{16}$ in. up to $\frac{1}{2}$ in. on 18 of the roads from which information was obtained. The thicknesses most frequently used are given in Table I.

FITTING BEARINGS TO WORN SHAFTS

Axles and armature shafts wear with use, normal factors of safety permitting a variation in diameter of perhaps $\frac{1}{4}$ in. between the size new and the size where the part must be scrapped, built up or re-turned to smaller size. Hence bearings must be provided with a variety of bores in order to give proper clearance for correct lubrication. In some cases this variation is taken care of with different thicknesses of the babbitt lining, and in others shells of different inside diameters are used with the babbitt of approximately uniform thickness. The practice on several roads is given in the following paragraphs:



Left—Armature Bearing Flange Built Up by Means of Oxyacetylene Welding Adds Approximately 50 per Cent to Its Life. Right—Axle Bearing Built Up by Means of Acetylene Welding on the Thrust Flanges and Other Parts Badly Worn

At the Decatur shops of the Illinois Traction System, shafts scored or worn tapered are turned to true them up. Standard practice is to provide a layer of babbitt approximately $\frac{1}{16}$ in. thick in bronze shells. Where measurements show that the bearing previously used will require a greater thickness of babbitt another bronze shell is used. This may be either a second-hand shell of proper size or a new bronze shell bored out, so as to allow $\frac{1}{16}$ in. of babbitt in the finished bearing. Every time a bearing is installed on an armature shaft a number is stenciled on the flange. When it is used a second time, the old armature number is removed and the new one replaces it.

In the design of bearings used by the Milwaukee Electric Railway & Light Company, the amount of babbitt to be left in a finished bearing is determined by the air gaps in the various motors, so that if all the babbitt were burned out, it would not allow the arma-

TABLE I—AVERAGE THICKNESS OF BABBITT, RUNNING CLEARANCE AND END PLAY IN INCHES ALLOWED WITH BEARINGS

Railway	Average Finished Thickness of Babbitt	Running Clearance in Bearings: Armature	Running Clearance in Bearings: Axle	End Play
Brooklyn-Manhattan Transit Corporation	1/8	0.012	0.012	1/16
Chicago Surface Lines	1/16	0.015	0.031	1/32
Denver Tramway	3/32 to 1/4	0.010	.....	1/16
Eighth Avenue Railway, New York	1/4 to 3/8	0.005	.....	1/4
Georgia Railway & Power Company	1/16 to 5/16	0.015	0.031	1/16
Illinois Traction, Inc.	1/16	0.004	.....	1/4 Max.
Long Island Railroad	1/8 to 1/4	0.006 to 0.012	0.012	1/32
Memphis Street Railway	3/8 to 1/16	0.015	.....	1/32
Milwaukee Electric Railway & Light Company	1/16 to 3/32	0.020	.....	..
New York Central Railroad	3/8 to 1/2	.....	.....	..
New York & Harlem Railroad	1/4 to 1/4	0.020	0.018	1/32
New York & Queens County Railroad	1/4 to 1/2	0.015 to 0.018	0.018	1/16
New York, Westchester & Boston Railroad	1/4	0.010	.....	1/16
Niagara, St. Catharines & Toronto Railway	1/16	0.007	0.015	1/64
Omaha & Council Bluffs Street Railway	3/16 to 1/4	0.001 per in. of Dia.	.....	1/16
Third Avenue Railway, New York	1/4 to 3/8	0.008 to 0.012	0.015	1/32
Toronto Transportation Commission	1/8	0.005	.....	1/16
Youngstown Municipal Railway	1/8 to 1/2	0.006 to 0.008	.....	1/32

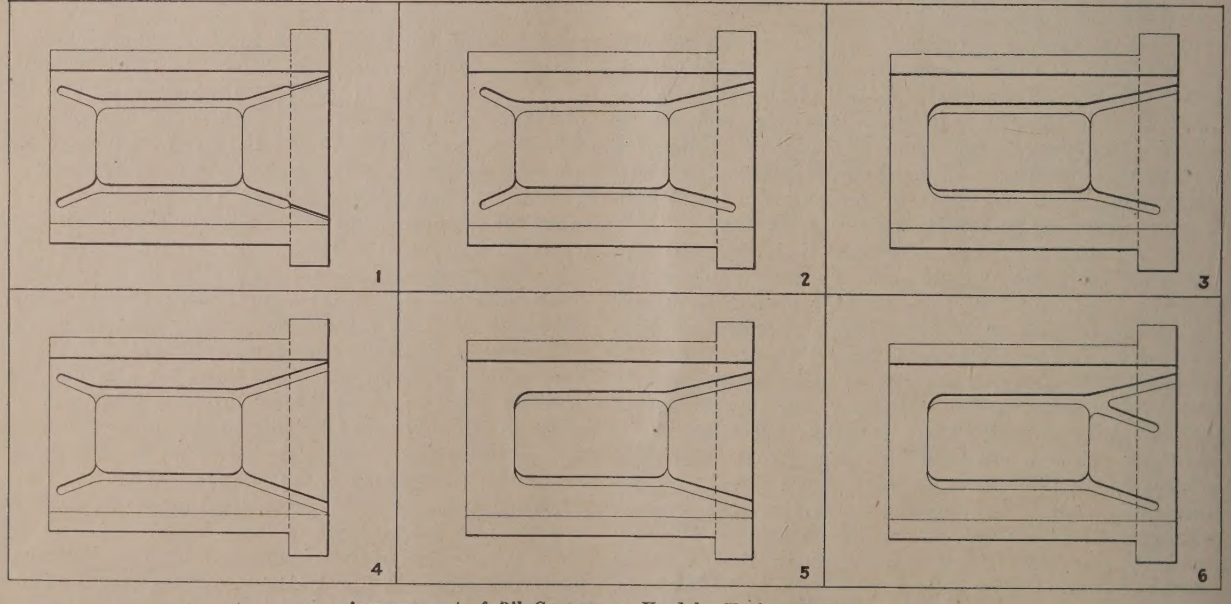
ture to drop upon the pole faces. For a GE-216 motor, 3/32 in. thickness is left; for a GE-80 motor 1/16 in., and for a Westinghouse 508 motor 1/16 in. It is seldom found necessary to turn down an armature shaft. Axle bearings are finish turned and are then kept in the storeroom until issued. One of the interesting features of the machining process is the method used to finish the joining surfaces of split bearings. This work is done on a Gardner power-driven horizontal abrasive grinding stone. Formerly this work was done on a milling machine or shaper, which took approximately five times as long as the present process. The grinding is done after the castings have been cleaned, but before they are turned in a lathe.

For its axle bearings the Omaha & Council Bluffs Street Railway uses cast-steel shells lined with babbitt almost entirely, except where the diameter of the axle is so close to that of the bearing housing that there is not room for a babbitt-lined shell. The minimum difference in diameter between the axle and the bore of the housing considered sufficient for the babbitt lining is 1 in., or a thickness on each side of the axle of 1/2 in. The practice is to use 1/16 in. to 1/4 in. of babbitt. Thus the minimum amount of babbitt allows 1/16 in. thickness for the cast-steel shell. If the clearance between the axle diameter and the bearing housing bore is less than this the solid bronze bearing is used, as on some types of motors where it has been necessary to increase the diameter of the axles. Axle bearings are babbitted to predetermined standard sizes, and are not bored when put on the axle. To provide for axle wear it is necessary to mold bearings to several sizes, which vary in steps of about 1/16 in. When an axle wears so as to give excessive clearance it is turned down to the next size, and the nearest standard oversize bearing is used thereafter until it is again necessary to repeat the performance.

Armature bearings in Omaha are bored to individual fit for each particular armature shaft at the time that they are installed. The practice after babbitting these bearings is to broach them to certain standard sizes, in which they are carried in stock. When a call comes from the armature room for a set of bearings, the babbitt is then bored out to fit the individual armature shaft.

Steel shells are favored for armature bearings as well as for axle bearings. Although no cost figures were available it is considered that the cast-steel shells and babbitt lining produce a saving in cost over bronze shells.

The practice of the Third Avenue Railway, New York, is to provide an average thickness of babbitt of from 1/4 in. to 3/8 in., and in fitting bearings three sizes are used. For example, for a 4 1/2-in. shaft new bearings are bored out to 4 1/2 in. plus clearance. When the bearings are romoved at an overhauling the shaft is gaged. If the shaft allows a snap gage of 4.44 in. to pass over it, it is turned down to 4.4 in. diameter, and a bearing of 4.4 in. plus clearance is used. The next time the shaft comes in, if a gage of 4.34 in. passes over it, it is turned down to 4.3 in. diameter, and a bearing of 4.3 in. plus clearance is used. Whenever a



Arrangement of Oil Grooves as Used by Various Railways

1. Used in Brooklyn. 2. Used in Youngstown. 3. Used by Third Avenue Railways, New York City. 4. Used by Georgia Railway & Power Company, Memphis Street Railway, New York, Westchester & Boston Railroad and Niagara, St. Catharines & Toronto Railway. 5. Used by Chicago Surface Lines, Denver Tramway and New York & Queens County Railroad. 6. Used in Toronto.

shaft comes in which allows a gage of 4.24 in. to pass over it the shaft is scrapped. Standard bearings are thus 4½ in., 4.4 in., and 4.3 in. plus clearance.

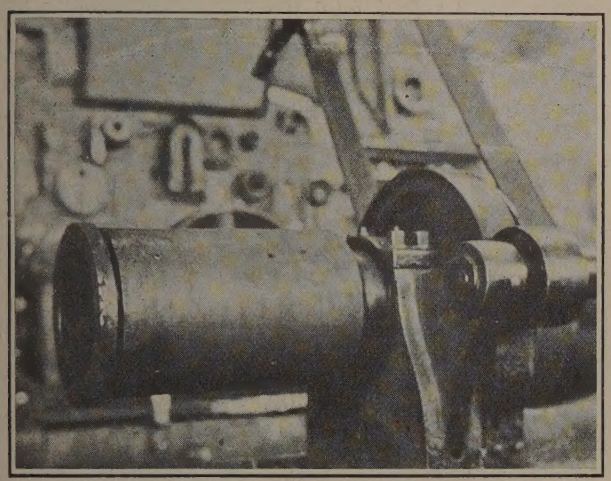
Running Clearances Allowed

The running clearances allowed for both armature and axle bearings was found to vary considerably on different properties. These are shown in Table I. As a guide to what is considered good practice by motor manufacturers the following is given:

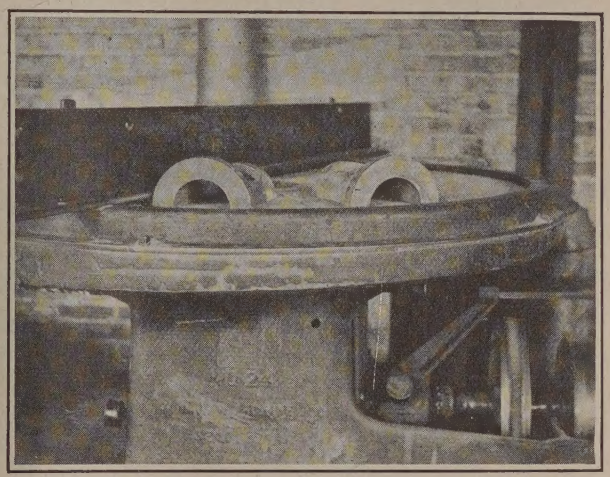
RECOMMENDED CLEARANCES FOR ARMATURE BEARINGS USING OIL AND WASTE LUBRICATION

Sizes	Clearance
2 in. up to 3 in.	0.006 in. to 0.008 in.
3 in. up to 4 in.	0.008 in. to 0.010 in.
4 in. up to 5 in.	0.010 in. to 0.014 in.
5 in. up to 6 in.	0.014 in. to 0.016 in.
6 in. up to 7 in.	0.016 in. to 0.018 in.

On the Illinois Traction System babbitted bearings are bored out 0.004 in. larger than the armature shaft fitted. Bronze shells are turned approximately 0.002 in. larger than the bore of the motor housing. When the bearings are pressed in, the interior bore is reduced in size to approximately 0.0025 in. larger than the shaft diameter.



Cylindrical Chuck for Holding Split-Axle Bearings While Being Bored and Machined in the Wheaton Shop of the Chicago, Aurora & Elgin Railroad



The Connecting Surfaces of Axle Bearings Are Finished on a Horizontal Grinder in the Shops of the Milwaukee Electric Railway & Light Company

The Youngstown Municipal Railway is now using a special form of nickel-bronze bearing. This was described in the Aug. 16 issue referred to at the beginning of this article, and clearances used were given.

Each of the two methods of fitting described above has its advantages and disadvantages. Where armature bearings are fitted directly to the shaft on which they are to be installed, the work must be done where the cars are inspected, except where a railway shop has only one operating carhouse, and this method requires the fitting of bearings by carhouse men who are usually not skilled machinists. This method also necessitates proper equipment at each carhouse to do this class of work. Longer service will be obtained if the bearings are fitted exactly to the shaft, but this work ordinarily can be done properly only in a machine shop with the correct tools and expert machinists.

The method of turning armature shafts to standard sizes and carrying the corresponding bearings in the storeroom to accommodate these diameters has the advantage that the machine work can be done efficiently, so as to obtain an accurate fit. Its disadvantage is that where the correct size of bearing is short or missing there is a tendency on the part of the carhouse men to use the next larger size, rather than to withhold the motor from service. One point brought out in this survey is that the man in the pit at the inspection shop is the one responsible person for the character of work done. Master mechanics and foremen issue instructions as to the methods to be followed, but pressure of work and the insistence that cars be returned to service promptly often lead the workmen to use their own judgment.

Fitting Bearings to Housings

The finishing of the outside of armature and axle bearings is just as important as boring them out. Wear is sure to occur on the outside of the bearings and also in the housing fits or motor frames in case there is any looseness in the bolts which hold the bearings in place. Such looseness causes pounding, which not only shortens the life obtained from the bearing but allows the outer surface to rub against the housing and causes excessive wear between dowel pins and dowel holes or keys and keyways.

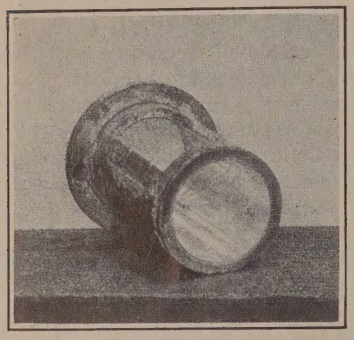
On most railways, while particular care is taken in the installation of armature bearings, axle bearings do not receive equally close attention. There is no air gap of which to take measurements, and there is no danger of excessive damage such as would result should an armature rub the pole faces. The wear on axle bearings, however, is really greater and the service is harder than on armature bearings. The hammer blows to the bearings are more severe since there are no springs between the axle and the track. These bearings are allowed to remain in service much longer than the motor designer would recommend, as information obtained clearly indicates. Just as much damage is done from excessive wear on axle bearings as on armature bearings when the lives of gears, pinions and armature windings are taken into consideration. Excessive clearance or loose fit in bearings causes the distance between centers to change so that the gear and pinion do not mesh properly and excessive tooth pressures result.

A number of different methods are used by various

companies for machining the outsides of bearings. The precautions taken to insure tightness also vary. Some practices are given in the following paragraphs:

At the Wheaton shop of the Chicago, Aurora & Elgin Railroad the thrust flanges of both axle and armature bearings are built up by means of acetylene welding, ofttimes as much as ½ in. being added, after which the bearings are machined to exact size. The company states that this practice has been found satisfactory.

For machining split axle bearings, a sleeve chuck is used in an 18-in. engine lathe, with an interior bore that will accommodate the axle bearing. The chuck is



At the Decatur Shops of the Illinois Traction System Bronze Armature Bearings Are Finished on the Outside 0.002 In. Larger Than the Hole in the Housing.

Approximately $\frac{1}{16}$ in. of babbitt is used on the inside and this is finished 0.004 in. larger than the diameter of the armature shaft. The shrinking of the bearing into its housing contracts the bore to approximately 0.0025 in.

of sufficient length so that the thrust flange will fit against its end. The bearing is held in position with eight pointed setscrews. The inside bore is finished and the thrust flange machined to smooth off the welded surface at one setting.

Shims Are Not Favored

Several methods are used for obtaining a tight fit of the bearing in its housing or in the motor frame. The majority of the railways included in the survey do not favor shims or liners, although others are using them. The materials used for shims include canvas, cardboard, fiber and tin. A practice considered better by several of the railways is welding and boring out the housing or bearing fit. Metal is also frequently welded to the outsides of the bearings themselves. Reasons given for unsatisfactory results where shims are used are that the wear on the shells and bearings is uneven, and it is virtually impossible to shim a bearing so that the pressure between the two motor shells will be evenly distributed. With uneven wear on the bearing or its housing, the shims are always tight or pinching at the high spots, with a loose fit at low spots. Many railways do not spin their armatures with power or rotate them by hand after the motor is assembled, so that a tight fit on the shaft is not detected and hot bearings result.

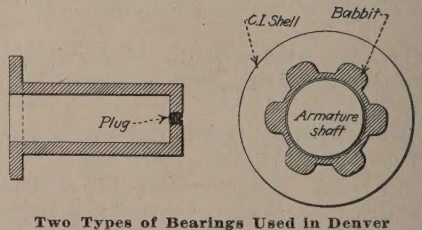
In Denver, shims are not used to hold bearings tight when the housing bores become worn. Due to a former practice of using unfinished bearing castings which were pressed into the housings, some of the housings have become excessively worn. These are now being welded and rebored. In the past, when metal shims were used to hold the armature bearings tight in the end housing, these would work loose and in some cases shift over the bearing windows and so restrict the flow of oil to the bearings. The present practice of welding and reboring has resulted in longer life of bearings.

In the shops of the Omaha & Council Bluffs Street Railway it is the practice to plane off the faces of the axle caps until the bearing is clamped tightly with the bolts drawn down. In order to determine the amount of metal which it is necessary to face off the practice is to drive a thin wedge under the bearing until it is tight in the housing and then to measure the thickness of wedge inserted. The amount of metal taken off the axle caps is $\frac{1}{64}$ in. greater than this measurement, so that the bearing will be tight when the cap is drawn down.

When the armature bearing housings become worn, it is the practice to use over-sized castings for the bearing shells so that they will be tight. Under no circumstances are shims of any kind permitted.

Results obtained by railways which are welding and reboring their motor frames indicate that this practice merits careful consideration. The cost of welding and reboring runs from $18 to $25 per set of two armature and two axle bearing fits. Of course, the cost will vary, depending upon how well shops are equipped to handle this class of work. Several railways have motors which were originally designed for babbitt-lined cast-iron bearings, but in which bronze shells have been substituted. This requires an excessively thick bronze shell. With the practice of welding and reboring the diameter of the opening in the housing can be reduced so that a bronze bearing of standard thickness can be used. This reduces the cost for bearings considerably. In some cases the cost of welding and reboring is nearly compensated for by the decreased price of a set of bearings. On some railways the weight of the bearings has been reduced 50 to 60 per cent by the reduction of the fits in motor housings.

The practice of using heads to hold the bearings in the frame, as employed in the latest types of motors, overcomes part of the difficulty experienced with the split frame without heads. The same degree of care, however, should be exercised to keep these heads tight in the motor frames and also to keep the bearings tight in the heads, or else the same trouble in bearing fits will result as with the old type split-frame motors. In welding and boring a split-frame head, it is possible in many cases to use steel plates and weld these in place so that the amount of welding metal is reduced.



Two Types of Bearings Used in Denver

Armature bearing shells for GE-58 motors are cast solid at the end and finished with a screw plug to keep dirt and water from getting into the bearing. This is necessary because the narrow gage used subjects the motor to considerable wheel wash.

Cast-iron armature bearings are cored out so as to provide six lugs. These are bored out $\frac{1}{16}$ in. over the armature shaft diameter. The thickness of babbitt over the lug is small enough so that there is no danger of the armature getting down on the pole faces.

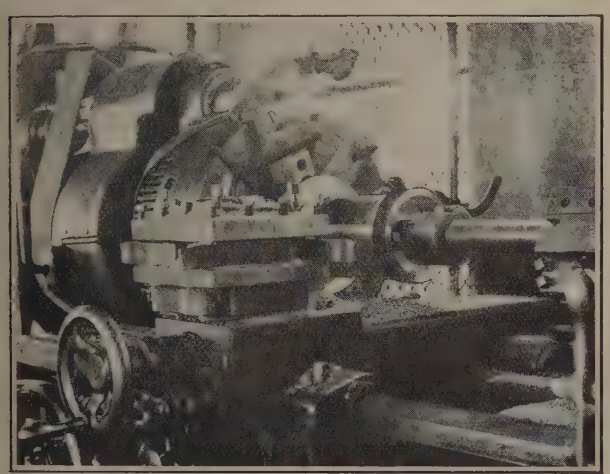
A method of welding on steel rings to build up worn housings which has proved satisfactory consists of drilling out the worn tap-bolt holes and driving cast-iron plugs tightly into them. The worn housings are then turned down and a steel ring about $\frac{3}{8}$ in. thick is shrunk on and welded. If the housing has a double flange, one of these must be cut off and a new flange made on the ring. The ring is then turned to insure

a good tight clamping action of the two halves of the motor frame when bolted together. New holes are drilled and tapped in the housing through the shrunk-on ring into the cast-iron plugs to receive the bolts.

Some precautions recommended by motor manufacturers to keep housings on motors of the split-frame type from wearing are as follows: (1) Keep frame bolts and housing bolts drawn up tight; (2) see that lock washers are applied to all bolts; (3) use a good grade of heat-treated steel bolts; (4) remove all dirt at the split when assembling motors; (5) keep armature bearings in good condition; (6) inspect bolts regularly and systematically and keep them drawn up tight.

To keep the various parts of motors tight and with good clamping fits, the Westinghouse Electric & Manufacturing Company has given the following allowances:

On malleable-iron housings of box-frame motors an allowance for tight driving fits of 0.001 to 0.003 in. made on the housing is recommended. The bore of the frame at the fit should be from exact size to 0.002 in. under size. Keys are not used.



Split Bearings Are Clamped Together and Finished as One Unit on a Semi-Automatic High-Speed Lathe in the Shops of the Milwaukee Electric Railway & Light Company

Convenient Storage of Bearings After They Are Finished Assists Materially in Taking Care of Requirements in the Milwaukee Electric Railway & Light Company's Shops

With malleable-iron housings of split-frame motors an allowance for a clamp fit is provided in the housing seat on the motor frame. It is recommended that the housing seat be machined to exact size with single liners 0.017 in. thick placed at the split of the two halves of the frame.

For armature bearing shells of malleable iron or bronze in box and split-frame motors with housings, an allowance for a press fit is recommended of 0.002 to 0.004 in. made on the bearing shell. The average pressure for pressing in should be from 3 to 5 tons at the commutator end and from 5 to 8 tons at the pinion end.

Malleable-iron and bronze armature bearings in split-frame motors without housings should have an allowance for a clamp fit provided in the bearing seat on the frame of the motor. As already stated, this should be provided by the insertion of 0.017-in. liners while the seat is being machined. This same method should be followed for axle bearings of malleable iron or bronze.

In connection with any of the preceding work it is important to have the surfaces that are fitted together machined and gaged accurately. The fitted surfaces should be given a smooth finish, since a rough surface provides a poor contact. When keys or dowels are used they should be held tightly in one of the pieces and be given the minimum practical clearance in the other part. In pressing two pieces together it is advisable to use a lubricant, such as white lead mixed with lard oil or machine oil, on the surface of the fit, and to get a true alignment at the start.

Axles with enlarged wheel and gear seats have fillets at the changes in diameter. The ends of axle bearings should be rounded off accordingly. The practice on the majority of railways is to make the radius of the rounded portion on the axle bearing larger than the radius of the fillet on the axle itself. This insures that the bearing can go into place properly, without danger of binding on the fillet. Several railways obtain the same result by cutting a chamfer off the inside edge at the flange end. This is easier to machine.

Other points which are given attention in the machining of bearings by a majority of electric railways consist of chamfering the inside edges of waste openings or windows and the edges of oil grooves. Of the 20 railways covered in this survey all but three were using oil grooves in their bearings. In most cases these are either machined or are cut with a chisel. A few, however, are molded into the lining. Six different arrangements of oil grooves were found on the railway properties visited, as given in the accompanying illustrations. All of these have at least one oil groove leading to the flanged end of the bearing. This is the hardest point to keep lubricated, and probably most hot bearings start from heating there. An important point in the location of oil grooves is to make certain that the inside ends of the groove start from the chamfered portion of the window. With this arrangement the chamfered portion forms a trough in which oil accumulates and thus feeds to the groove. On the railways which do not use oil grooves to the outer end of the bearing, reasons given for the omission of grooves at this end are that the window is so close to the outer end that grooves are unnecessary.

The amount of end-play allowed for armatures when bearings are fitted was found to vary from $\frac{3}{32}$ in. to $\frac{1}{4}$ in. The practice used by the various railways is given in Table I.

A Typical Example of Solid Concrete Track Construction with Concrete Paving in Kansas City

Rigid Track Experience in Kansas City

Approximately 46 Miles of Track Has Been Built in Solid Concrete with Various Types of Paving—Both Wood Ties and Steel Ties Have Been Used—Thermit Joints Have Stood Up Well

By A. E. Harvey

Superintendent Way and Structures, Kansas City Railways

DURING the past twelve years there has been constructed in Kansas City 242,230 ft., or approximately 46 miles, of track in solid concrete. This work has been done with various kinds of paving, and at the present time the greater part of the track is in first-class condition. Trouble has been experienced with certain types of welded joints and some wood block paving has proved to be unsatisfactory. The track structure in general, however, has stood up well and no serious rail corrugation has developed. The experience of this company indicates that the noise produced by the passage of cars is due more to the condition of equipment than to the nature of the track structure.

Disintegration of the pavement along the rail led the Kansas City Railways some time ago to undertake rather extensive experiments with various methods of building track. The independent movement of the parts of a flexible structure was believed to create openings into which water entered, so that it destroyed the track foundation. In an attempt to eliminate this action track was built on a concrete base in such a way that the completed structure was practically rigi

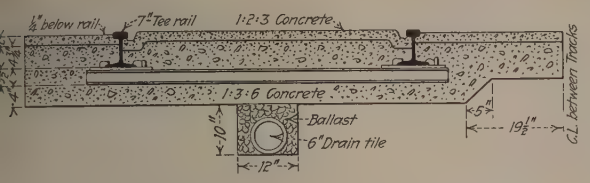
At first the track was built with a solid concrete bas and a cushion of sand under the ties. Although th design remedied all the defects occurring in the sul grade, it was sufficiently flexible to permit independer movement of the rail and pavement. Another desig was tried, therefore, in which the ties and base of th rail were entirely inclosed in concrete up to the bas of the paving material. This type of track structur gave good results, but it was necessary to excavate t a considerable depth under the wood ties in order t give the concrete slab sufficient strength.

It was thought on this account that there might b advantages in a type of construction wherein substitut ties of shallow depth were used. This would permit minimum amount of excavation and the ties and th rails would act as reinforcing bars for the concret It was hoped that this design would largely eliminat the independent movement of the rail and pavemen Several kinds of substitute ties have been tried an in general they have produced good results.

Tamping Concrete Under the Ties as It Takes Its Initial Set

Type of Track Structure Used in Kansas City with Substitute Ti

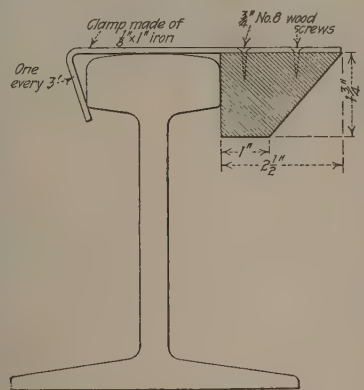
Solid concrete construction was first used in 1913, hen about 36,900 ft. of track was built, using white ak ties, 7-in. T-rail, with thermit joints and granite ock paving. At the present time, this track is in most perfect condition and practically no money has een spent on it for repairs. The following year 260 ft. of track was constructed, using 100-lb. .S.C.E. rail, Carnegie steel ties, bolted joints and arious types of paving. Today the base, ties and eneral track structure are still in good condition, but



Where Concrete Paving Is Used the Concrete Is Poured in Two Courses

ome repairs to the bolted joints have been necessary, nd the wood block paving deteriorated badly in places. During several following years wood ties were again sed. This construction has stood up as well as the rack built in 1913. In 1918 5,690 ft. of single track as constructed in solid concrete, with Carnegie steel ies, concrete paving and 80-lb. A.S.C.E. rail. No epairs have been made up to the present time on this rack. In 1920 the use of International steel twin ties as begun, and since that time 35,100 ft. of single rack has been constructed in this way. The results hat have been obtained both in the matter of cost and n the quality of the work have been satisfactory. In eneral, the cost of the material is greater for the teel tie structure and the cost of labor somewhat less. his is due to the fact that steel ties are considerably asier to handle and the track can be brought to gage ith less effort.

Where concrete paving is used the concrete is placed n two courses. The base course is placed first and he concrete thoroughly tamped under he rail and ties as it akes its initial set. mmediately thereafter a second or finish ourse containing a richer mixture is placed by a second rang of workmen and a second concrete nixer. This is done t once, in order that he concrete may set n a single mass without a seam. When T-rail is used flangeways are provided by he use of wood forms. These are of pine or cypress and re made in 12-ft. lengths. The design is shown above.



A Wooden Form of This Shape Is Used to Make the Flangeways

Experience with monolithic concrete construction in Kansas City shows that little damage occurs through expansion of the rail and very few cracks occur in he concrete surface. Paving of other types has been ound, in fact, to be more subject to this trouble than s concrete paving. The absence of trouble from this ource may be due to the fact that the concrete and teel have very nearly the same coefficient of expansion.

Keeping Cars Clean in the Twin Cities

Regular Reports, Systematic Routine and Continual Vigilance Found to Be the Secret of Obtaining Uniformly Good Results

THAT clean, well-painted, fresh-looking cars are an important element in keeping car riders pleased with the service rendered by the street railway company has come to be accepted by most progressive operators. It has also been demonstrated that money invested in paint and scrub brushes is at most a very small part of the total cost of maintenance of equipment, but represents one of the most effective methods of obtaining favorable publicity.

In the Twin Cities, systematic effort and continual vigilance have been found by the mechanical department to be the two most effective factors in keeping cars in this desirable condition. This kind of work requires supervision by a comparatively rare type of man—one who has the ability to organize his work for efficiency and who, at the same time, has sufficient imagination to maintain an enthusiastic attitude toward a type of work which is performed with common labor and which is sometimes looked on by mechanical men as being a necessary nuisance. It is needless to say that it also requires interest, enthusiasm and continual vigilance on the part of general executives to keep such a man pitched up to a key of interest that will produce consistently good results.

Careful analysis of various methods of carrying out the work of car cleaning and washing have led to the subdivision of this work, so that each car is kept at all times in the best possible condition consistent with reasonable cost. This subdivision of cleaning activity includes the following operations: Sweeping, dusting, scrubbing, washing and general car cleaning.

A total of 850 cars are in service on the lines of this company. During the month of June, 28,806 cars were swept. This includes sprinkling sweeping compound over the floor, sweeping this out thoroughly, and spraying the interior of the car with disinfectant. Eighteen men are engaged in this work, and the average time per car is approximately 8.66 minutes. It is evident that the total number of cars gone over per month is equivalent to sweeping each of the 850 cars practically 34 times per month, or a little more than once per day.

Dusting consists of thoroughly wiping seats, shades, windows and the other interior parts of the car, to remove interior dust. Twenty-two men are engaged in this work, and the average time per car is 31 minutes. During the month of June, 7,749 cars were gone over in this way, which is equivalent to dusting each car on the system nine times during the month, or a little better than twice per week.

Five men are engaged in the work of scrubbing floors. Thorough cleanliness is considered the best form of sanitation, and is superior to the use of large quantities of disinfectants. The practice in scrubbing cars, therefore, is to give the oak floors a thorough old-fashioned hand and knee scrubbing, as a housewife would scrub the floors of her home. During the month of June, 1,073 cars were so scrubbed, in an average time of 59 minutes per car. This is equivalent to going over each car about 1¼ times per month.

When a car is washed, the outside is gone over thoroughly with lukewarm water and long-handled

brushes. If the car is unusually dirty, as is sometimes the case after protracted periods of bad weather, a weak soap solution is applied first, and is then rinsed off with clean water. Pails and brushes are used for car washing in preference to spraying methods, due first to the flexibility and simplicity of this method which eliminates an excessive amount of car shifting, and also to the economy in the use of water. During the month of June, 8,104 cars were washed by 16 men, in an average time of 22½ minutes per car. The total number of cars gone over is equivalent to washing each car 9½ times per month.

When a car is given a general car cleaning, it is gone over both inside and out. Ceilings, curtains, windows, floors and exterior are thoroughly washed and scrubbed when necessary. Oxalic acid is used to remove tenacious dirt on painted surfaces. The time spent on a car is 12.07 hours, and when it is completed all dirt has been removed from corners as well as from those parts that show more conspicuously. During the month of June, 261 cars were cleaned in this way. This is equivalent to putting each car through this process approximately once every three months. There are thirteen men engaged in this work.

Systematic reports by the man in charge of car cleaning to the head of the mechanical department form the basis of following up this work. These reports are made up in detail, so that the head of the department can tell at a glance whether any part of the work is being allowed to lag, or whether the efficiency of the men doing the work is being allowed to fall off. It is only by virtue of continual interest on the part of the department head that this work can be kept from lagging either in thoroughness or volume. Total labor costs for car cleaning in the Twin Cities average approximately $2.75 per thousand car-miles. It is part of the price of keeping patrons pleased with the car service, and reductions in expenditures for this purpose represent poor economy from the standpoint of the company's relations with its patrons.

Corrosive Effect of Slag

Detroit Investigation Shows 54 per Cent of Base of Rails Eaten Away in 21 Years

BY W. R. DUNHAM
Executive Engineer Department of Street Railways, City of Detroit

THE effect of slag on a rail section is brought out very clearly in the illustration accompanying this article. Not only is the corrosion shown but some light is thrown on the difference between wear on the head of the rail due to traffic and what has actually occurred, or the apparent wear which would be indicated from an inspection of the head surface only.

The sketches are from an actual section cut from the rail after its removal from the track. The rail, an 85-lb. A.S.C.E., was laid in 1903 and removed early in 1924. The track area from the top of the ties was back-filled to the head of the rail with furnace slag.

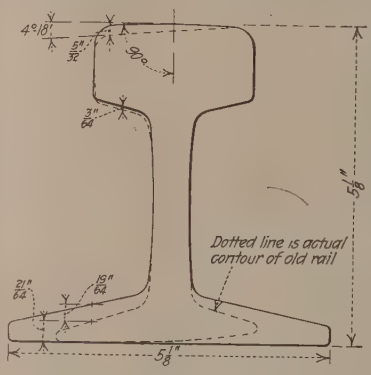
The accompanying table gives under "New Section" the areas in square inches and per cent of metal in the head, web and base and is taken from a steel company handbook. The areas and percentages given under "Worn Section" are for the section as shown by dotted lines, the areas being derived by planimeter. The last column in the table gives the losses in per cent of the different rail parts from corrosion. It will be noted that

DISTRIBUTION OF METAL OF RAIL SECTIONS NEW AND AFTER 21 YEARS IN THE TRACK

Rail Part	New Section: Area in Square Inches	New Section: Area in Per Cent of Total	Worn Section: Area in Square Inches	Worn Section: Area in Per Cent of Total	Worn Section Per Cent Change in Area
Head	3.50	42	3.25	50	7.1—
Web	1.75	21	1.85	28	5.7+
Base	3.05	37	1.40	22	54.0—
Total	8.30	100	6.50	100	21.7—

there has been an apparent gain in the web area. This is due to the increased length of the fishing section on account of the corrosion on the base.

It is interesting to note that, under traffic, the head and web on the gage side have bent down and in toward the center line of the track respectively. Had the wear of this rail been measured from the surface, it would have indicated a total wear of $\frac{5}{32}$ in., or 0.0372 in. wear per 5-year period. It will be noticed, however, that nearly half of this amount is due to a vertical bending of the head. The actual wear, therefore, is but 0.0260 in. or 69.9 per cent of the surface indication per 5-year period. It would be interesting to know how many of the rails on which the wear is measured from time to time in connection with the question of renewal for wear have this same feature, so that no differentiation has been made between the actual abrasion and the abrasion plus the bend in the head and web.



Original and Final Section of Rail Laid in Slag, Detroit

Photomicrographs of the head were also made in order to determine the reduction in height due to cold rolling. While the effect of the cold rolling was shown, the amount of this reduction was negligible in so far as measuring for loss of head surface due to wear.

The apparent surface wear of a rail head as indicated by an inspection of the surface only was really made up of three things: Abrasion, compression of the metal from the wheel passing over it and the depression of the head through the bending of the web from the loadings carried.

As cinders and slag have been recommended for ballast, this article is pertinent in showing the effect of slag on rails in contact therewith.

In an article appearing some time ago in the ELECTRIC RAILWAY JOURNAL, giving an improved method of placing concrete under steel ties in new track construction as worked out by the Cleveland Railway, the method used was described as follows: ". . . the material used being as mix of slag screenings and cement." This mixture was tamped under the steel tie plate and in intimate contact with both the steel tie plate and the steel channels composing the tie. It is presumed that after the tie fails from corrosion, this failure will be used as an argument against substitute ties, while the practice of using slag ballast against steel rails will be continued.

The rail section from which these sketches were made was of great interest to the writer, and it is hoped that this article will be of interest to way engineers generally.

Equipment Maintenance Notes

Drop Punch for Thin Material

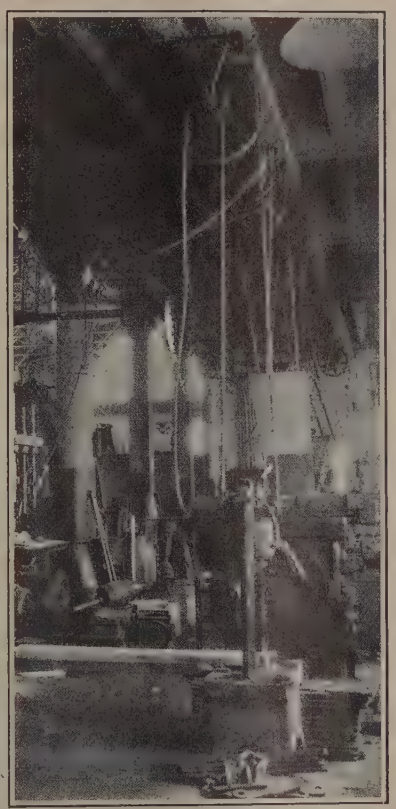
THE pantograph shoes used by the New York, Westchester & Boston Railway require five holes in each end. The holes are ¼ in. in diameter with ¾-in. countersinks, and the pantograph shoes are made of No. 14 gage blue annealed steel. The four outside holes are used for

End of Contact Shoe Showing Holes as Punched

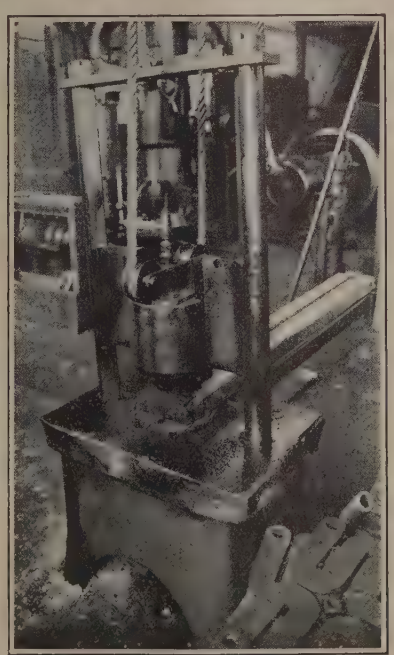
screwing the shoe in place, and the center hole, which comes in the groove of the shoe, is an oil hole.

A shop-made drop punch has been constructed for punching all five holes in one operation. The bed of the punch is a discarded anvil base the top of which is about 15 in. above the floor. Into this are fastened the two upright guides which were 2½-in. steel shafts. The inner sides of these guides have been planed off to a V shape and the punch weights, together with the removable head for holding the punches, slide up and down between them. The drop weight is a piece of an old 8-in. axle and weighs approximately 125 lb. The weight can drop 18 in. from the raised position. A removable die fits into the bedplate. The drop weight is provided with a top stud extension so that with the weight raised this stud passes through the top support and a spring safety catch fits into a groove of the stud and automatically locks the weight in position. To release the weight a lever is pushed inward, forcing the spring catch out of the groove in the stud. When the machine is not in operation a pin is inserted back of the safety catch to lock it permanently.

The method of raising the weight preparatory to dropping is novel. A ¾-in. rope with one end attached to an overhead support passes downward and through two 2-in. sheaves mounted on top of the drop weight, from where it again passes to a 6-in. sheave mounted on a short shaft overhead. The free end is used by the operator to tighten the rope and thus lift the weight. An 18-in. pulley on the overhead shaft is driven from the shop countershaft. By pulling on the loose end of the rope, the sheave on the countershaft raises the weight until it is automatically locked, so that no effort is required of the operator. In order to drop the weight for punching the safety catch is released.



Rope and Sheave Arrangement for Raising the Punch Weight



Pantograph Shoe in Position After the Punch Weight Has Dropped

An extension arm made of ½-in. x 1½-in. bar steel holds the pantograph shoe in position while it is being punched. With the full drop of 18 in. the holes are punched at one operation. A drop of half this height is used to make the countersinks. The base has a double groove underneath, so that the punchings are fed out of these grooves and one punching pushes the one ahead, so that it is self-cleaning.

Pull-Ins Reduced

THE report of the Electric Railway Association of Equipment Men, Southern Properties, for the first nine months of 1924 shows an

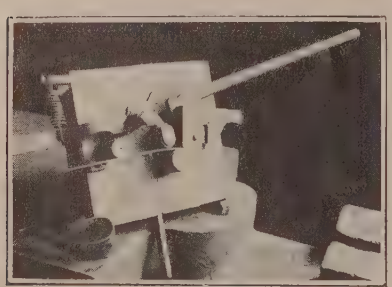
COMPARATIVE STATEMENT OF CAR PULL-INS

	Average Car-Miles per Chargeable Pull-In	Total Average Car-Miles per Pull-In
New Orleans:		
September	158,272	55,051
Year to date	121,919	35,312
Nashville:		
September	56,901	25,288
Year to date	34,844	18,044
Memphis:		
September	29,924	23,019
Year to date	22,119	17,668
Little Rock:		
September	14,183	10,131
Year to date	19,060	14,891
Knoxville:		
September	25,582	13,644
Year to date	18,190	11,888
Birmingham:		
September	18,883	15,363
Year to date	13,658	11,006
Atlanta:		
September	9,407	7,025
Year to date	12,479	9,241
Mobile:		
September	35,102	29,251
Year to date	10,276	7,220
Dallas:		
September	7,680	5,422
Year to date	4,767	3,224
Dallas (Texas Electric)		
September	7,914	5,845
Year to date	.....	.....
Chattanooga:		
September	6,151	3,515
Year to date	.....	2,817

average car mileage per chargeable pull-in of 121,919 at New Orleans as against 110,653 miles for the first five months, as mentioned in ELECTRIC RAILWAY JOURNAL for July 19, page 91. The railways in Nashville, Memphis, Knoxville, Birmingham, Atlanta and Dallas all showed similar improvement. Nashville was again second to the leader, New Orleans, but Memphis was in third place at the end of September, Little Rock having lost that distinction. Figures of the individual companies for the month and for nine months also are given in the accompanying table.

Die for Making Journal Box Cover Springs

DUE to the fact that the cost of the special springs used on journal box covers by the Twin City Rapid Transit Company was high, particularly when they were purchased in comparatively small quantities, the mechanical department of



Journal Box Cover Springs Are Formed at the Rate of 100 per Hour by One Man Using This Ingenious Die that was Developed in the Twin City Rapid Transit Company's Shop

the company found it desirable to make these springs in its own shop.

At first these were made by hand at a cost of approximately 18 cents each. Later, however, a special die of the type shown in the accompanying illustration was made up, and through its use it became possible to make these springs at a cost which is about 40 per cent of that of the hand method.

The spring is tapered throughout its length and is formed into a reverse curve of fairly complicated shape.

At one end these springs are 3 in. wide, and taper from that to 1 in. at the narrow end. Stock is purchased $\frac{1}{8}$ in. x 4 in. and is cut up into pieces $12\frac{1}{2}$ in. long, which is the proper length for making the spring. This material is split diagonally and the hole punched in one end. The entire forming operation is then carried out on the die.

A blank for one of the springs is shown in position in the die, for the beginning of the forming operation. At the right is the operating handle. In the position shown, this handle has just been pulled down so as to disengage the latch shown at the top of the die. This action allows the roller shown in contact with the blank to descend into place under the action of the helical spring fastened to the lever projecting to the left from the die. In the position shown for the operating handle, the jaw in the die block grips the right end of the spring blank. Above this position of the operating handle this jaw is released, and when the handle engages the latch at the top the roller is also lifted out of position against the action of the spring at the left.

To form the spring the operating handle is swung through slightly more than a semicircle, in a clockwise direction. When this is done the roller holds the blank firmly against the die block which is formed to the proper shape for the completed spring, and as the jaw in the block holds one end of the blank the latter is formed to the shape of the block as the latter is revolved with the handle. As the block nears the end of its cycle the reverse curve in the end of the spring is formed by the die as it presses the blank against the round plug shown just under the roller spring lever.

When the spring has been formed the handle is rotated back until it engages the roller release latch, at which time the jaw in the die is also released. The short lever shown projecting below the die is then used to eject the finished spring.

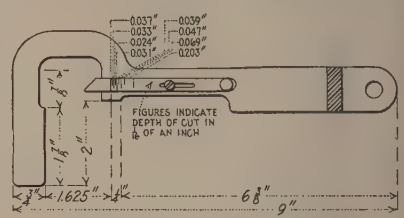
This tool is operated in connection with an oil heating furnace by one man. With this equipment he can heat and form aproximately 100 springs per hour.

Flange Gage for Wheel Turning

IN THE shops of the Department of Street Railways, city of Detroit, the special type of gage shown in the accompanying illustration was developed for facilitating the work of turning flanges of rolled-steel wheels.

This gage was designed and made in the shop. It enables a workman to determine the depth of cut required to bring a flange back to the proper dimensions. A graduated slide shows directly in fractions of an inch the depth of cut required.

The slide is mounted in the gage so that it comes in contact with the wheel at the proper gage line. When an old pair of wheels is set up in the lathe for turning the gage is slipped over the flange, the slide is moved forward until it comes in contact with the wheel and the amount

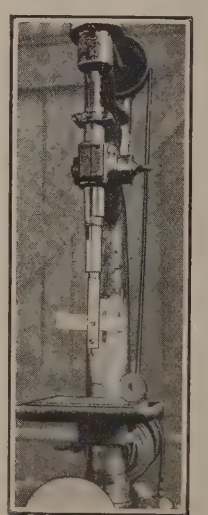


Adjustable Gage for Wheel Flanges

of metal to be taken off is read directly from the scale. Thus a saving is made not only in the time required for the turning operation but also in the amount of metal taken off the wheel. This prolongs the total useful life of each wheel.

Cutting Magnet Coil Tops

A TOOL has been designed and made in the Decatur shops of the Illinois Traction System for rapidly cutting magnet coil tops out of red fiber without an excessive waste of material. The tool, in appearance, resembles an expansion bit without the intervening cutting blade between the centering point and the outside cutting edge. It has a tapered shank and fits into the customary $\frac{3}{8}$-in. taper chuck on the drill press. At its lower end an adjustable cross member, held in place by a setscrew, carries two tool-steel cutting bits. These bits are of quarter-inch round steel ground to a thin cutting point. The cutting end is $\frac{1}{16}$ in. wide and $\frac{3}{8}$ in. long. The bits are held in place by setscrews in the cross member. The distance between the two cutting tools is approximately 1 in. It is not the practice to cut



Device for Drilling Out Magnet Coils

Magnet coil tops are drilled from $\frac{1}{4}$-in. red fiber insulation material by means of an adjustable cutting tool which fits into a small drill press.

both the inside circle and the outside circle at one operation. Two bits are available in order to expedite the work of cutting both small and large size tops. The red fiber insulating material, which is usually ¼ in. thick, is clamped to the drill press table and after a centering hole has been drilled the tool is brought down upon the fiber in the same manner as in drilling.

Modified M. C. B. Journal Brass

A MODIFIED form of M.C.B. journal brass is used on the high-speed cars of the Chicago, Aurora & Elgin Railroad with good results. The standard M.C.B. journal has beveled corners, and the journal wedge the necessary extensions to fill the space. This type of journal is liable to side oscillation. As a result of the frequent starts and stops of an electric car, brasses are worn out quickly.

The changes in design inaugurated by the shop engineers of this

M.C.B. Journal Brass and Wedge Modified to Prolong Their Life

railway include the filling up of the beveled corners on the brass and the elimination of the triangular lugs on the wedge to give a brass with a flat top and a corresponding flat wedge. The construction does away with all journal box oscillation, and gives a longer life to the brass. The redesigned wedge, which can be machined entirely with a shaper, is a flat piece of steel with one surface tapered $\frac{1}{16}$ in. in both directions from the ends to the center. This taper allows for a longitudinal oscillation and centering of the brass upon the axle.

All old journal brasses are built up at the corners by welding on steel pieces, as shown in the illustration. New journal brasses are made according to the modified design. The new type of wedge will operate with either the old or the new designs of brasses.

Dick Prescott's Opportunity

It Finds Him Ready

DICK PRESCOTT felt somewhat uneasy as he knocked on the door of Thomas Mullaney's office. A morning summons from the general foreman was generally considered among the shop employees of the Consolidated Railway & Light Company as an incident boding no good results. Despite his uneasiness, Dick had himself well in hand as he opened the heavy door at the gruff invitation from the interior of the sanctum. The self-confidence generated by habitual sincerity of thought and speech, combined with the consciousness of having made a whole-hearted endeavor to be as useful as possible under the circumstances in which he found himself, gave Dick that feeling of having "played the game" which caused him now to face any eventuality with confidence.

As he opened the door, his eyes sought those of the general foreman in mild inquiry. He was agreeably surprised and relieved by what he saw there. A faint twinkle that he had never noticed before gave him the feeling of one who, upon pulling aside a dusty and forbidding curtain, discovers beyond a cheerful and inviting interior. Dick suddenly realized that all of Thomas Mullaney's "hard-boiled" exterior was merely a cloak which had come about him through many years of routine adherence to precedent, and that the man within was warmly human and likable. He accepted the gruff invitation to be seated with mixed feelings of admiration, respect and sympathy for this crusty old veteran who had kept things going along with a fair degree of efficiency through many changes in conditions and deficiencies in management.

Mullaney got into his subject quickly and in his blunt manner outlined the purpose of the interview. He offered Dick the opportunity of organizing an engineering department in the shop and suggested that if Dick felt able to tackle the job he would ask the general manager to send him and one of the foremen on an extended trip to gather ideas from other properties. It was evident that Mullaney had at last recognized in Mr. Milburn, the new general manager, an executive with vision and courage, and realized that the new era which was dawning on the property called for young blood and new ideas.

After outlining his proposal briefly, Mullaney shifted the inevitable cigar stub to the other side of his mouth and leaned back in his weatherbeaten old chair with a kindly smile at the eager boy across the table.

"Well, what d'you think about it? Believe you could handle that job?"

"I think I could, Mr. Mullaney. I've spent practically all my spare time for some years in railway shops, and also worked for two years when I had to drop out of school because of lack of funds. I've been keeping my eyes open here, and though I'd have to take things slowly at first, I believe I can see a real opportunity for co-ordinating an engineering department with all of the other shop activities from construction to handling of materals, so as to make it a real agency for cutting down lost motion, improving methods and increasing efficiency.

"Your suggestion for a trip to other properties is fine. I'm pretty well acquainted with many of the practices in other shops, as I have been studying the files of the ELECTRIC RAILWAY JOURNAL ever since I came here, and in that way have compared many of our methods with those of other roads. Such a trip would give me some definite ideas as to just how we can get an engineering department under way, so that each foreman will understand that first of all its purpose is to make it easier for the various shop departments to do better work."

"All right, my boy, you've got the idea exactly. You're pretty young, but I think you can handle this thing if you keep your feet on the ground. Get yourself ready to leave next Monday and I'll talk to you again before the end of the week. Now go tell Steve White that I want to see him right away."

As Dick stepped out of the office he was filled with mingled emotions of joy and impending responsibility, but the former took precedence to such an extent that he literally had difficulty in keeping his feet on the ground as he hastened in search of Steve.

Sand Blast Used for Many Purposes

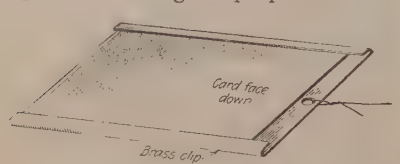
IN THE shops of the Kansas City Railways a sand-blasting equipment has proved useful for many purposes in connection with car overhaul and repair work. On most repair and overhaul jobs men will do better work if the parts are cleaned

By Cleaning Car and Truck Parts with This Sand-Blast Outfit Better Workmanship Is Obtained at Kansas City

when they are taken off the cars. Consequently, in addition to its use for cleaning the sides of steel cars, the sand-blast outfit illustrated is used to clean truck frames, parts of door and step mechanism, miscellaneous castings, dash-iron plates, etc. Cleaning such parts makes them easier to handle, and at the same time improves the character of work that is done during repair or overhaul. It also has been found that by thus thoroughly cleaning up the surface of castings and similar parts, defects, cracks and blow-holes are shown up which might otherwise go undiscovered.

Simple Tag Holders

IN MOVING materials between carhouses and shops it is usually necessary to employ some type of tag for indicating the proper destination and other information regarding the material handled. In the shops of the Department of Street Railways, city of Detroit, a very simple type of holder has been devised to prevent the mutilation of these tags as they are handled at various points on the system. This holder consists of a flat piece of brass with two edges folded over so as to form clips for the tag. The two folded edges are cut back at an angle at the corners to allow the card to be inserted readily. The card is put in with its face toward the brass clip, thus preventing the instructions from becoming obliterated in the handling. A piece of flexible wire through a hole in the holder and the card holds the latter securely in place and also serves to fasten the holder to the box or package in which the materials are packed. This simple device is shown in an accompanying illustration.



Brass Tag Holder Used by Department of Street Railways, Detroit

New Equipment Available

Double-Deck Six-Wheel Buses for Los Angeles

WHAT is said to be the first double-deck six-wheel bus to be used either in this country or abroad was recently placed in service by the Los Angeles Railway. This vehicle is built by the Moreland Motor Truck Company, and it is claimed that the six-wheel construction permits the use of pneumatic tires on the rear wheels. This could not be done with a four-wheel double-deck bus, because of the excessive weight on each wheel.

The construction used is of the Goodyear type, where each axle is attached to a strong semi-elliptic spring hinged in the center. By using this type of suspension, each of the four rear wheels may be raised or lowered to a degree greater than is possible with the ordinary four-wheel construction without raising the body.

With this design the center of the spring to which the frame is attached moves up only one-half the amount which the wheel moves. Braking is effected on all six-wheels by a combination air-hydraulic system. The sides of the bus are made of Plymetl, and the roof is of Haskelite.

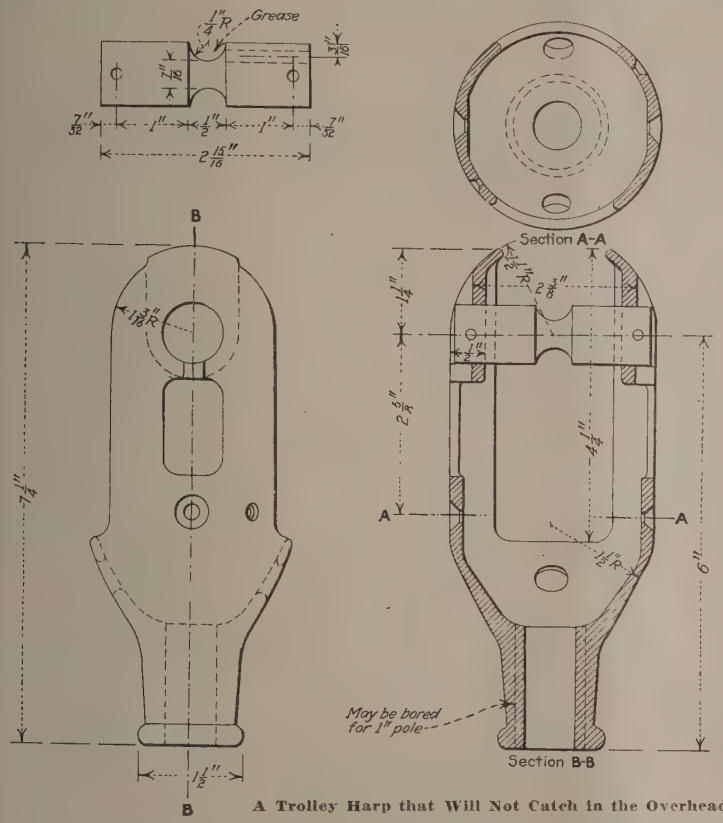
Light-Weight Harp

A TROLLEY HARP with increased strength but of light construction is being introduced by the R. D. Nuttall Company, Pittsburgh, Pa. The arms of the harp are rounded on the outside, and their ends have a spherical contour. There are no ribs or other projections, leaving no sharp edges or corners to catch in the overhead wires in case the wheel leaves the wire. All screws and rivet heads come flush with the outside surface, while the axle pins and cotter pins are kept within the outside contour. The weight of the harp and wheel is 6 lb.

Contact washers may be used inside but the contact spring is arranged to bear directly on the wheel hub so that contact washers are not necessary. Contact springs are readily replaced when worn by a slight turn on the clamping screw, which releases the contact spring so that it can easily be withdrawn.

An improved type of axle pin is

Pneumatic Tires Can Be Used on This Double-Deck Bus, Because the Six-Wheel Construction Reduces the Load on Each of the Rear Wheels



A Trolley Harp that Will Not Catch in the Overhead

also a part of the new device. Grease is forced through a hole in the pin which communicates to a large annular groove on the outside, bringing the lubricant in direct contact with the base of the wheel.

Inclosed Coil Heater

A CAR heater is being placed on the market by the Railway Utility Company of Chicago which embodies several interesting new features of design and construction.

The heater unit itself is of the inclósed type, using a resistor of nickel-chromium ribbon, corrugated or reflexed in a refractory insulating material which it is claimed does not deteriorate from the action of sudden high temperatures. This is said to give a unit which will stand the extreme voltage variations encountered in railway work, including extreme over-voltages for quite lengthy periods of time.

A novel feature of the case construction is the provision of a ventilating flue in the back where it is placed against the side of the car and at the top where it would come in contact with passengers. In the panel-type case, which is usually installed under longitudinal seats, this feature is for the purpose of preventing radiation of the heat generated by the unit to the space under the cushions. In the vestibule and truss-plank heaters, this flue feature is said to prevent radiation through the sides or ends of the car.

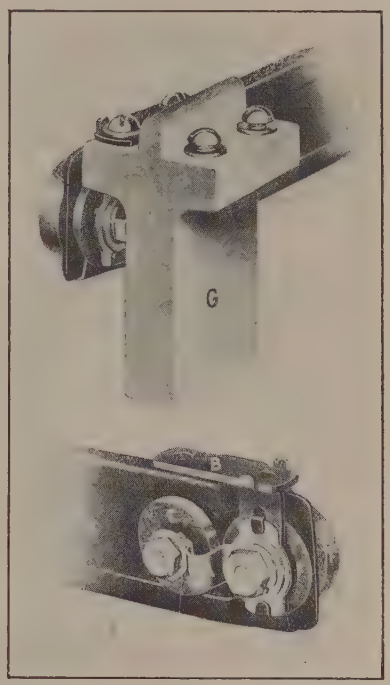
It is claimed that the flue action is so effective that increased temperature of the elements actually results in decreased temperature of the top and back of the case. This flue construction also makes it permissible to install these heaters without placing fire resisting material behind them.

The cross-seat heater is manufactured with a solid baffle on the top, so that it is not required to add sheet metal under the seat cushions to prevent the heated air pocketing at that point.

All the cases are designed to permit access to the interior without disturbing the wiring or conduit.

In the accompanying illustration showing the mounting of the heating element, the expansion strap, *A*, is welded to the mounting bracket, *B*, which is fitted with a clearance washer to allow free movement of the heating unit, thereby providing means to relieve the mounting bracket *B* from strain due to expansion and contraction of the unit.

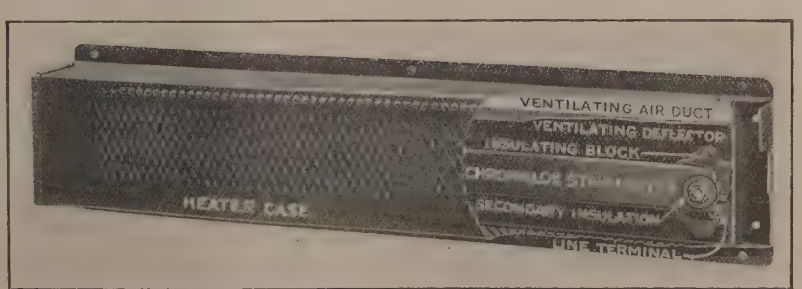
The "Lavarock" terminal insulator,



Detailed Views of the Terminal Mounting, Showing the Arrangement for Safety and Accessibility

C, is designed to seal the outlet, preventing any accumulation of dust or moisture that might cause leakage from the sheath to the terminal. The heater sheath *E* is further insulated from the mounting bracket *B* by heavy "Pyroplax" flanges, *F*, which constitute a secondary insulation between the heating unit and mounting block *G*.

This mounting block is of heavy molded "Pyroplax" insulating material with threaded metal inserts molded in, for fastening.



A Ventilating Duct in the Case Keeps Down the Temperature of the Top and Back and Eliminates the Need for Insulating Material Behind the Case When It Is Mounted

American Association News

This Year's Exhibits a Half-Million Dollar Show

Equipment for Modernization of All Departments Featured the Display at A. E. R. A. Convention—Space Taken by the 194 Exhibitors 14½ per Cent Greater than in Any Previous Year

THE exhibits at the Atlantic City convention of the American Electric Railway Association this year were bigger and better than ever before. There was more new apparatus and equipment shown than at any previous convention, indicating that the manufacturers are doing their part toward modernization of the industry and following more progressive lines of thought in the design of their equipment. Three railways and the association itself contributed to the educational value of the convention by instructive exhibits.

More space was taken for exhibition purposes than in any previous year. A total floor space of 86,349 sq.ft. was used by 194 exhibitors, an increase of 10,920 sq.ft. over that occupied at the 1923 convention, which was the largest up to that time. In per cent the increase amounts to 14½.

In analyzing the various equipment lines displayed the exhibit of buses was most extensive. Of the entire space 23,743 sq.ft., or 27½ per cent of the total, was occupied by bus displays. There was a total of 54 complete buses on exhibition together with 12 stripped chassis. The buses shown were either of a de luxe type or of attractive design intended particularly for display and to attract attention. Many of the delegates remarked that the very sight of such magnificent buses made them want to ride.

The editors of ELECTRIC RAILWAY JOURNAL collected considerable information this year as to the cost of exhibits to the various manufacturers. Based on information from more than half of those who had displays, it is estimated that about $569,000 was expended by manufacturers in placing their products on display at the Pier. This shows that the manufacturers certainly did their part as a contribution toward making this convention a success.

The decorative features and the scheme of colors used were new and attractive. Probably the most striking feature was the treatment used in the main ballroom at the entrance. The motif followed was Chinese. Stands with Chinese lanterns were placed on the foyer floor and additional Chinese lanterns were carried on supports on the pillars. The balcony was hung with Chinese decorations and a big drop picture at the end of the hall showed a water scene with a Chinese junk in the center. Directly opposite the entrance was a pagoda with Chinese dragons and lanterns. Special treatment was also given to each of the other exhibit halls. Thus the Annex was in green and white, Machinery Hall and the meeting rooms were in white and gold.

RAILWAYS EXHIBIT PROGRESS MADE

Three railway companies exhibited practical examples of their work in booths fitted up in a manner as attractive as those of the manufacturers.

The Chicago Rapid Transit Company and the Chicago, North Shore & Milwaukee Railroad showed samples of the artistic and effective posters that have been used in connection with their work. In addition, some of the original water-color paintings from which the posters were made served to illustrate the care which is taken to obtain high-grade work.

The Public Service Railway displayed pictures of every phase of its big transportation system—cars, buses, ferries, terminals, power houses, and substations. An interesting feature was a map showing the old pre-war 5-cent fare area compared with the present 5-cent area. Charts on one-man car operation, bus time-tables, and window posters were included.

THE ASSOCIATION EXHIBITED STANDARDS AND PUBLICITY MATERIAL

The association attempted more than ever before and it has succeeded in doing more in its exhibit. In short, it kept in step with the bigger, better and brighter than ever slogan. Through the courtesy of various manufacturers and operating companies, a display of standard designs of overhead line materials, track materials and car equipment materials was prepared. In addition, there was a number of charts showing track standards and certain proposed standards.

Another section of the booth was devoted to posters, prepared by the association's advertising and publicity section.

The Association's Bureau of Information and Service prepared a number of charts to show the vital statistics of the industry. These were so displayed that he who runs may read. In addition to these charts the bureau exhibited copies of its various compilations and reports, together with other association literature.

Among the standard devices shown were axles, journal boxes, brake shoes, limit of wear gage, bolted joints for 9-in. girder grooved rails and for 90 and 100-lb. standard A.R.A. and for 80-lb. A.S.C.E. rail. There were in addition standard rail designs and a complete line of standard line material for overhead trolley, as contained in the Engineering Manual, Section D, 102-21. Then there were charts to show the standard uniform system of track spirals, turn-outs and cross-overs, car clearance easements, proper location of tongue switches and dimensions of tongue switches, mates and frogs, bolted rail and manganese steel crossings, together with gages and flangeways.

The committee on city and interurban operation had an exhibit of copies of committee reports and handbook of modern methods and practices. A number of attractive posters, illustrating electric railway advertising, were shown and especial attention was attracted by the posters of the London Underground group, of which a large variety was on display. United Railways & Electric Company, Baltimore, Md., furnished a safety display for use in the schools of Baltimore to teach children the fundamental principals of safety.

MANY ATTRACTIVE BUSES SHOWN

In the exhibit of buses and bus accessories there were many novel designs. The Six Wheel Company and the International Motor Company displayed several models of six-wheel buses. The Transit Equipment Company featured an Uppercu coach with front wheel drive. Advantages claimed for this arrangement include low floor height, simplicity of frame construction and short turning radius. As the tractive effort is always in the direction of travel it is said that a more abrupt steering angle can be used. A bus with 220-in. wheelbase can be turned in a 50-ft. street.

The Yellow Coach Manufacturing Company showed several double-deck models with both pneumatic and cushion tires. This company's new design of sleeve and poppet valves for bus service was of particular interest. The Continental Motors Corporation showed four different types of six-cylinder bus motors. There were various arrangements of power brakes which showed marked improvement both in design and construction. These included air, hydraulic and a combination of the two. Safety devices have also been applied to buses which include a complete pneumatic safety control system, with interlocked accelerator and "deadman's" feature. Air brakes of the Westinghouse automotive type included a 3-cu.ft. high-speed compressor, with capacity for supplying air for all pneumatic purposes.

A new combination air-hydraulic sys-

tem of four-wheel brakes was shown by the Timken-Detroit Axle Company. In addition to this feature the front axle had a large drop which allowed for low floor construction. The exhibit of buses was noteworthy particularly for its great variety and included many double-deckers, new light-duty types, parlor car arrangements with wide windows, individual seats and smoking compartments. The bodies also showed marked improvement in lighting, heating, and ventilation.

Railway Supply Companies Show New Developments

The modernization taking place in the manufacturing end of the railway industry was shown in many of the displays of the manufacturers and supply companies. These covered a wide range, improvements having been made for practically all departments.

It was easy to spot the new devices shown by the Westinghouse Electric & Manufacturing Company, as each development was marked with a large orange star. A further departure was the display of apparatus still in the experimental stage. Among these were two developments in motor lubrication practice. The first was an oil sealed housing. The new design of housing appears to have many advantages. The feed of oil is made constant at all times by pumping it into the chamber. The separate general supply chamber is kept filled, so that the amount of oil that must be added is not left to the oiler's judgment, and the supply to the waste chamber is automatic. In the second development, a new sealed sleeve bearing, oil is prevented from leaking into the winding and dirt and grit are kept out of the oil. It is claimed that additional oil is required only once or twice yearly.

Recent developments of renewal parts were on display, which included a unique scheme for ventilating old type motors. This scheme is said to increase the continuous capacity of the motors by more than 30 per cent with only 2 per cent additional weight. For convenience in rewinding armature coils, rebanding and repairing commutators, all insulating materials are now assembled in standard packages by the Westinghouse company, so that every item required is ready for the workmen to use. A new development in brush holder design included a detachable box, which facilitates necessary replacement at low cost. Another new type of brush holder shown was provided with a dust cap to prevent the entrance of sand or dirt into the brush holder.

Power men were particularly interested in the new type of oil immersed transformer developed to prevent explosions and increase insulating and cooling properties. In this construction the oil level is below the top of the tank, so as to provide a gas space of sufficient capacity to permit the rise and fall of the oil level. The breathing action of the transformer deoxidizes and dehydrates the inhaled air, thus maintaining the gas space with dry inert gas. A diaphragm construction is provided which ruptures in case an abnormal pressure develops.

The General Electric Company had a large display of its products to show how that company could help modernize electric railway equipment. The car equipment man's attention was attracted to the reduced number of standardized railway motors and to improvements in light-weight multiple-unit control and improved equipment parts. A new type of brush holder with renewable carbon-way has been designed to reduce maintenance cost. New designs of overhead line material and sectionalizing equipment showed the company's effort to reduce the investment in distribution copper. New types of welding equipment were shown, which should make substantial savings in the reclamation of parts. The general idea in the entire exhibit was to show apparatus in actual operation and to group this equipment around a display of parts and materials which could be used for maintenance.

A new idea in the merchandising of line materials was shown by the Ohio Brass Company. It was called a traveling catalog and consisted of a truck equipped with special body, arranged so as to display a full line of O.B. line material when the truck was open for inspection. This truck has made an extended trip of over 100,000 miles and has visited a great many railway properties.

Improvements in Car Heaters

All of the various heater companies showed improvements in electric heaters for cars. The Railway Utility Company showed a new type of inclosed coil heater. The heating element consisted of nickel chromium inclosed in a refractory material. It possesses large overload capacity without danger of overheating and damaging parts. A novel feature of the case construction included a ventilating flue in the back at the top of the case. This feature was intended to prevent radiation through the sides and ends and so decreases the temperature at the top and back of the case.

Interchangeability of heater parts was featured by the Gold Car Heating & Lighting Company. New designs of electric heaters selected for use by the New York Central and Baltimore & Ohio Railroad were shown. The principal feature of these was simplicity in design, so as to reduce the number of parts. Particular attention was given to terminal arrangement.

A new design of heater coil construction was shown by the Consolidated Car Heating Company, which was intended to take up less space and thus could be used in replacement of the inclosed element units. The Consolidated Car Heating Company also showed its new type of pedal control for doors. The particular features of this equipment were the small amount of space required underneath the platform for operation of the doors and their control by depressing a pedal.

The National Pneumatic Company also showed a very large number of door engines and door control equipment. Full-sized models of cars were used to demonstrate the best practice in door engine installation, and the importance of safety in control and operation was emphasized. A new development shown was a four-way selector and grouping valve, which with a single control handle actuates any one of four door engines or couples up any two of them.

An improved type of step construction was shown by the Irving Iron Works. The principal feature was the open construction used, so that dirt, snow, ice and the like would fall through and prevent slippery or wet conditions either on the steps or inside the car. The construction also provided a non-slipping surface under all conditions.

Several new designs of seats for cars and buses were shown by the various seat manufacturers. The American Car & Foundry Company showed a new type of reversing mechanism with link construction. The pedestal was made of pressed steel and was independent of the seat end. A single automatic foot rest was operated by the power arm. All parts subjected to stress were drop forgings and particular attention was given to interchangeability of parts.

A very complete line of new developments in car seats was also shown by the Hale-Kilburn Company. The distinctive features were increased comfort, attractive appearance, and particular attention to producing parts which would lower maintenance costs.

A new contribution to the motor coach seating line was shown by the Heywood-Wakefield Company. This consisted of three types of chairs, which showed the last word in beauty and comfort.

A new type of car flooring called Truss-plate was exhibited by the Wheeling Corrugating Company. This type of flooring has been used by the Boston Elevated Railway and the Interborough Rapid Transit Company with a mastic covering as the wearing surface. It weighs but 4 lb. per square foot, and is of particular advantage in light weight car construction.

Valuable information as to where Haskelite and Plymetl could be used to advantage in reducing car weight was shown in the exhibit of the Haskelite Manufacturing Corporation. This type of construction is also proving of advantage in reducing the noise and drum effect in all-steel car construction and in providing necessary insulation against cold.

The Railway Improvement Company had an exhibit arranged to show improvements that would reduce railway motor maintenance. This consisted of a revamped 101-B motor removed from service on the Connecticut Company. New heads and bearings in this motor were designed particularly to insure long life and decrease trouble. The weight of each axle bearing was reduced from 10 to 15 lb. and special attention was given to provisions that will make the bearings stay tight when installed.

Fare Collection Systems

There were very complete displays of fare boxes and fare registering equipment. A new combination electric coin and token controlled passimeter was shown by the Perey Manufacturing Company. This equipment is adapted to any combination of two coins or tokens. This company also

showed an interesting fare box and overhead register combination, which provided automatic, instantaneous, visible and audible registration. Improvements in fare collection were also shown by the Rooke Automatic Register Company in the form of its new automatic register, which takes nickels, dimes and quarters.

The Cleveland Fare Box Company showed a new locked box and key of peculiar design for use with fare boxes. This was a four-way box with eight levers and 16 locking surfaces. A new detail fare recorder was also exhibited by the Ohmer Fare Register Company, which had a capacity for recording fares ranging from 1 cent to $9.99.

A new design of light-weight trolley harp was shown by the R. D. Nuttall Company. The shape of the harp was arranged to eliminate all ribs and projections and give a smooth outline with no sharp edges or corners to catch in overhead construction. All screws and rivets were made flush with the outside surface. Other improvements included an axle pin with special provision for grease lubrication and new design contact springs.

The new type of direct-connected trolley catcher used by the Boston Elevated Railway formed a part of the exhibit of C. I. Earll. With this construction all brackets are eliminated as the catcher is bolted directly to the car. Provision is made for easy removal of the entire unit or the drum may be removed separately for inspection and overhauling.

Improved methods for painting cars proved a live subject for discussion and demonstration at the various paint displays. The R. F. Johnson Paint Company demonstrated some late developments in finishing of cars and buses. A new two-coat enamel system, requiring only a day and a half for application, was one of the late developments by this company.

Aluminum paint for car decoration and painting attracted considerable attention at the exhibit of the Aluminum Company of America. The use of paint as an advertising material and as a preventive of accidents was stressed by all the various paint salesmen and yellows and various orange shades seem to be the colors most in demand. At the exhibit of the Glidden Company demonstrations were given of the economies resulting from the use of Ripolin railway enamels.

Five Electric Railway Cars Exhibited

On Arkansas Avenue, just across the Boardwalk from the Pier, were displayed five complete cars. These included one of the new Illinois Traction System's light-weight interurban cars as built by the St. Louis Car Company. This car was arranged for one-man and single-end operation. Light weight was a big feature and this car completely equipped weighed but 36,840 lb. and is taking the place of old equipment in the same service that weighed 90,000 lb.

Another car shown was a double-truck safety car, built at the American Car Company's plant in St. Louis for the Eastern Texas Electric Company, at Beaumont, Tex. Double folding doors were provided at diagonal corners, and a motorman's door on the opposite side of each platform. The weight was 28,500 lb. with seating capacity of 48.

A light-weight interurban car for the York Railways, mounted on Brill 77-E-1 trucks, and a special single-truck safety car built at the Kuhlman plant for the Columbus, Newark & Zanesville Railway were also shown. The York car seats 52 passengers, and the Zanesville car has a capacity of 28.

The de luxe idea in cars influenced the design of another car shown with the group. This had a low level floor, and seats for 48 passengers. Particular attention was given to a pleasing interior finish.

Track and Line Material

Way engineers found much of interest in the various track and paving exhibits. An alloy steel crossing built of 9-in. flange-bearing rails rolled to fit with A.E.R.E.A. standard 9-in. sections was shown by the Lorain Steel Company.

A new design of ground throw switch in a very compact box was exhibited by William Wharton, Jr. & Company, Inc. The operating lever lies on top in a recess in the cover of the box. This makes it possible to have a tight fit which will keep out dirt, water and other refuse. The mechanism is steel throughout and will work the same as an ordinary spring box set to throw either way or for one-way traffic.

A bituminous material shaped to fit any rail section was shown by the Philip Carey Company. This is being marketed under the trade name of Elastite rail filler and provides a resilient cushion that takes up vibration and movement of the rail. The construction also provides a watertight joint so as to keep out water and frost.

Many new specialties were shown of interest to the line department. Hubbard & Company showed many new devices for transmission, distribution and signal work. These included pole steps, dead ending clevices, wire holders, pole-top fixtures and spreader racks. A new pole-hole digger was shown by the Buda Company. This company also showed many specialties in trackwork.

The accounting department of railways found much interest in the labor-saving machines exhibited. A new typewriter key punch was shown by the Powers Accounting Machine Company. This was a combination of a standard typewriter and a key punch so as to eliminate punch operators. The typist in making out invoices can punch the tabulating card at the same time as the other record is made. A new duplicating machine for making copies of reports, statements, bulletins and other forms written with typewriters, pen or copying pencil was shown by the Beck Duplicator Company. This is being marketed under the trade name of "Speedograph."

A new type of coin assorting and accounting machine, which is in use by the Conestoga Traction Company, was exhibited by the Lancaster Automatic Coin Assorting and Counting Machine Company. This machine automatically feeds coins to the sorter and counter without an attendant. A variety of new machines for sorting, counting and wrapping coins or tokens was also shown by the Sattley Company.

Engineering Executive Committee

THE first meeting of the new executive committee of the Engineering Association was held at Atlantic City Oct. 9. Those present were President Charles H. Clark, chairman; C. R. Harte, Daniel Durie, M. B. Rosevear, R. H. Dalgleish, F. H. Miller, G. C. Hecker and Past-Presidents H. H. Adams, J. H. Hanna and H. A. Johnson.

The report of the committee on subjects was read and approved with minor modifications. This report was published in the issue of ELECTRIC RAILWAY JOURNAL for Oct. 11, page 650. The principal modifications were the following:

The committee to consider carhouse wiring and car wiring rules of the National Electric Code was instructed to include in its studies the subject of wiring of garages used by electric railways for storage and maintenance of buses and trucks.

Two new subjects were added to the assignment of the committee on equipment: (6) Continue the study of helical and spur gearing; (7) study methods for reducing noise in car operation in co-operation with the committee on way matters.

An additional subject was assigned to the committee on heavy electric traction: (4) Continue the study of train operation, with particular reference to articulated trains.

Subject (2) of the assignment of the committee on power generation and conversion, as published, was eliminated. This was the study of uniform methods for reducing failures of power apparatus and interruptions to service originating within the generator or substation.

A new subject was assigned to the committee on power transmission and distribution: (8) Co-operate with A.S.T.M. on the following projects: (a) Bring into complete conformity the hard-drawn copper trolley wire specifications of the two associations; (b) prepare specifications for high-strength low-conductivity trolley wire for adoption as recommended standard.

A new assignment to the committee on way matters is as follows: (8) Study methods of reducing noise in car operation in co-operation with the committee on equipment.

A special committee on recording power failures was authorized with the assignment to study of uniform methods for recording failures of power apparatus and interruptions to service. This formerly had been assigned to the committee on power generation and conversion.

A letter from T. K. Murphy of Pratt & Lambert, Inc., was read, which outlined the advantages to the railways and manufacturers of standardizing colors for use in finishing electric railway cars. It was stated that there are more than 100 shades of green, yellow, orange, red, cream, etc., now in use and that a heavy overhead expense is involved in manufacturing all of these special colors. After a lengthy discussion it was the opinion of the committee that standardization of colors as proposed by Mr. Murphy would be impractical and it was voted to drop the matter.

It was voted to adopt the suggestion of C. F. Gailor that stickers be furnished railway member companies with the inscription "We use A.E.R.E.A. standards." It was also suggested that manufacturers might indicate in their catalogs which of the materials listed were standard.

A letter was read from H. C. Wallace of the Department of Agriculture inviting the association to send representatives to the national conference on utilization of forest products, to be held in Washington Nov. 19 and 20. R. H. Dalgleish volunteered to represent the association and invitations were also sent to committee chairmen interested.

A letter was read from A. B. Foote of the Division of Simplified Practice inviting the association to be represented at a conference to prepare a tentative simplified schedule of gages and sizes of sheet steel. The secretary was requested to have a representative of one of the car builders present at this conference.

Mr. Miller stated that the equipment committee had been requested to cooperate with the Society of Automotive Engineers committee in assisting the Public Utility Commission of New Jersey to arrive at a reasonable set of specifications for bus design standards which would be satisfactory both to operators and designers. After considerable discussion the matter was referred to the executive committee of the American Association with the statement that the Engineering Association stands ready to assist in this work if authorization is granted.

News of Other Associations

Commission Regulation Indorsed

Investment Bankers Consider Utility Problems and Make Recommendations on Powers of State Commissions

AT THE annual meeting of the Investment Bankers' Association of America, held in Cleveland, Sept. 22-24, Thomas N. Dysart, of William R. Compton Company, St. Louis, was elected president for the ensuing year, and Henry C. Olcott of the Continental & Commercial Trust & Savings Bank of Chicago was appointed chairman of the public service securities committee of the association. The report of this committee was the principal point of electric railway interest at the Cleveland convention. It was presented by Henry R. Hayes, chairman. An abstract follows:

REPORT ON SECURITIES OF PUBLIC SERVICE COMPANIES

In view of the increased popularity of public utility securities, especially noticeable this year, it is not today of prime importance to discuss methods of improving the acceptability of such securities. Investors generally recognize the inherent soundness of the public utility business. Essentially this condition has been brought about by the industry itself giving a frank and open story of its business and, in part, by its selling securities direct to the consumer. Besides this, the state regulatory commission and court decisions have had the effect of assisting the industry in adjusting itself to post-war conditions as well as protecting the business from malicious attack, too often of political origin.

The committee this year has been more concerned in studying problems which are or will soon be of concern to investment bankers, namely, those attendant on the great expansion of the public utility industry, which is destined to take place in the next twenty years.

The position of this association with respect to state regulation is defined in general terms in the 1923 annual report of this committee, as follows:

> The committee recommends, therefore, that members of this association urge, wherever lacking, that the state commission be vested with authority over the valuation, rates, services, and capitalization of privately-owned plants and that there be required and published full financial reports of operation.

This opinion assumes that statewide regulation must necessarily be administered in a broad and judicial manner in the interests of the public served, as well as of the investor. This association has not recognized any conflicting interest between the public served and the investor. On the contrary, it has pointed out that the interests of both are identical (see the 1922 annual report). However, it is far from being unaware that many, including self-seeking politicians, would have the public believe otherwise.

In the great expansion of the industry which is taking place there is keen competition for investment funds. Investors, therefore, can and actually do pick and choose their investments with discretion, favoring to a marked degree investments in those properties which are protected best by scientific regulation, rather than properties which are subject to the whims and fancies of state or local legislative bodies or executive officials.

We are continually reminded of the fact that more development takes place and rates and services are best in those states where state-wide regulation has not been subject to attack. There, we find, too, strong support of state regulation on the part of the public. Such results are obtained only when a legislature appropriates adequate funds for administration, and commissions are of proper caliber for their tasks.

For the present this committee has postponed, except in special instances, studies of the regulatory laws with respect to privately-owned properties in the following states and territories: Alabama, Arizona, California, District of Columbia, Georgia, Idaho, Illinois, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Tennessee, Utah, Vermont and Wisconsin.

Those states have been eliminated from its studies for the present, largely because there does not appear to be any immediate need for comprehensive changes.

With regard to the regulatory laws of states other than those above mentioned, it has recommendations to make to the district groups for their consideration. With respect to the laws of states not now reported upon, recommendations will be made in interim reports or direct to district groups.

The laws of many of the states vary greatly with respect to the term of franchises. State laws through constitutional provisions provide for the issuance of franchises of short duration—say 20 years. As we know, where the laws permit bonds are more often in good markets issued for longer terms. From the point of view of providing conditions for the issuance of securities it is distinctly in the interests of sound banking desirable to have issued by state commissions the so-called "indeterminate permits" as distinguished from franchises perpetual or limited in term.

This subject was discussed in the 1923 report, which sets forth, among other things, the states which do not require of these kinds of properties a standard system of accounting. The district groups of this association are again urged to exert efforts to accomplish sound accounting on the part of municipalities. As purchasers and distributors of municipal obligations it is surely a duty to do all that is possible to require sound accounting and administration on the part of municipalities.

The report was signed by Henry R. Hayes, chairman; Eli T. Watson, vice-chairman; H. M. Addinsell, Russell D. Bell, Charles R. Blyth, Chester Corey, John Esmond, Edgar C. Rust, C. J. Waddell, James C. Willson.

New England Club Meets Oct. 30

THE October meeting of the New England Street Railway Club will be held at the Copley Plaza Hotel, Boston, Mass., on Oct. 30. The afternoon meeting, which will be called to order at 4 p.m., will be devoted to a series of papers on the following subjects:

"Comparison of Maintenance Costs of Old and Modern Car Equipment," by W. C. Bolt, superintendent of rolling stock and shops Eastern Massachusetts Street Railway.

"Lubrication of Railway Motors," by H. N. Ransom, Railway Improvement Company.

At the evening meeting the topics will be:

"Education," by Edward Dana, general manager Boston Elevated Railway.

"Co-ordination of Motor Vehicle and Electric Railway Service by Electric Railway Companies," by A. E. Potter, president United Electric Railways, Providence, R. I.

"Observations at the A.E.R.A. Convention," by R. D. Hood, the general manager Massachusetts Northeastern Street Railway.

The News of the Industry

Protest Against Interstate Lines

Electric and Steam Railroads in Massachusetts Agitated Over Inroads of Unregulated Bus Lines

Electric railways in Massachusetts are resisting the alleged unfair competition of buses, particularly those proposed for interstate business. On the other hand the Attorney-General is being appealed to by the bus promoters to pave the way for such operation. In consequence the situation in central and eastern Massachusetts is growing acute.

The principal question appears to be: Shall interstate bus lines, which run from one state into the next, almost express between terminals, be permitted? If such lines are permitted, then the question appears to be: To what extent can the interstate lines be regulated?

Several interstate lines are now operating. Some of them have a joint terminal station in Providence. In some Massachusetts cities the Mayors have declined to grant any licenses to such lines; in others licenses have been granted, and in some the companies are operating without licenses on the contention that they need none. They claim that no state law can prevent a transportation line from carrying a passenger into another state, and in at least one instance a bus line has been brought into a local court and fined $10 for operating without a local license, and it has appealed the case in order to test the matter in a higher court.

PROTESTS OVER-RULED

Thus far the railroads have opposed the granting of licenses to these interstate bus lines, but the Massachusetts Public Utilities Department has overruled the railroads and granted state licenses on the ground that there is no law to prevent these companies from organizing and carrying passengers. Street railways also have protested, but it has been pointed out to them that they have the same right to establish bus lines as the new bus lines themselves. So far as the railroads are concerned, they have been acting separately thus far, but it is understood that they are formulating a general policy toward the interstate bus lines to be followed whenever the occasion arises.

A case under immediate consideration is that of the Interstate Limited Motor Coach Company, which operates a bus line between Fall River and Providence. James M. Swift, former Attorney-General of Massachusetts, is an officer in this company and is counsel for an association of such companies, known as the Motor Coach Association of New England. Mr. Swift has already argued his case once before the present Attorney-General, Jay R. Benton, to prevent the institution of injunction proceedings against the interstate bus lines. His association represents companies which run lines from New Bedford to Providence, from Taunton to Providence and from Boston to Providence. These lines have been granted joint station rights in Providence by the police authorities of that city.

Mr. Swift argues that the interstate lines are not law-defying organizations, but desire to give safe and reliable service so as to win good will. Hence they do not need local control as a police measure, and the opinion is that the law does not compel them to take out local licenses. Where they have asked for local licenses, so that their legality should not be questioned, the street railways have opposed them. Such is the case in Fall River, where the Eastern Massachusetts Street Railway offered the opposition. The railroads and the street railways contend that the interstate bus lines take traffic away from them to such an extent that the existing companies may be forced to abandon service.

Mr. Benton has been asked by a number of city solicitors to proceed in court to have the interstate lines enjoined from operating without license from the cities and towns traversed. He has given some semi-public hearings in his office at the State House and has more hearings scheduled for the near future.

Rapid Transit Plans Submitted in Chicago

Entire Situation There Reopened by Proposals Made by Mayor Dever, Mr. Blair, Mr. Busby and Mr. Insull, Together with Engineering Report by R. F. Kelker, Jr.

THE final determination of the Chicago city administration to push its own subway plan to a test vote on municipal ownership, possibly as early as next February, has been revealed by Mayor Dever. In a message submitted to the City Council on Oct. 22 he offered a proposal in competition to one drawn up by Henry A. Blair, president of the Chicago Surface Lines; another by Samuel Insull, representing the elevated lines, and one by Leonard Busby, head of the South Side Lines. These proposals and several alternate proposals are now before the local transportation committee of the Council and a fifth major proposal for a $225,000,000 subway system is being drawn by the reincorporated Chicago Municipal Subway Company.

Mr. Blair submitted his project as a private citizen. He came out for a consolidation of the surface and elevated lines under a unification plan which ultimately would figure beyond $350,000,000. Under it the city would be permitted to purchase the entire system "upon due notice" or by amortization of a price based on recent valuations of the lines plus $66,550,000 in surface and elevated lines extensions purposed to be completed in the next six years.

Following Mr. Blair's lead, Mayor Dever expressed hope of accomplishing virtually the same result through a different channel. He aims for eventual unification, with the city taking the lead. Mr. Blair would have the city as a partner throughout, but Mr. Insull did not provide for such partnership or for participation of the surface lines in his subway scheme.

With Mr. Insull in Europe, his attorney, Patrick J. Lucey, indorsed Mr. Blair's declaration that unification is the only solution of the Chicago transportation problem. Mr. Blair, in his transmittal letter, summarized his aims as follows:

> A single fare and universal transfers for both rapid transit and surface lines, service at cost, municipal partnership in operation and eventually municipal ownership. It should be possible for a Chicago citizen to board the street car in front of his home, transfer to a rapid transit train and enter the loop through a subway all for one fare.

Mayor Dever said he hoped the surface and elevated lines would come to terms, but that he could never consent to take up the $90,000,000 elevated securities and the $262,000,000 surface lines securities as suggested by the bankers' committee in the purchase negotiations.

Mayor Dever declared himself virtually committed to city ownership because the state laws governing utilities have been extended until the city has no control whatever over transportation or rates of fare.

His subway proposal is said to be largely the same as that suggested by Major R. F. Kelker, Jr., the city traction expert, who submitted a detailed plan for a downtown subway and projecting elevated lines to the City Council committee on local transportation.

The Mayor said:

> Unified service should be rendered at the lowest possible cost and at no profit, in order that a reasonable rate of fare can be maintained. The settlement should be on such a basis as to permit the car riders to transfer between the subway, the elevated lines and the surface car lines and ride from any one part of the city to any other part of the city. The settlement will not be satisfactory unless it involves a

restoration to Chicago of home rule over the local transportation facilities and unless it avoids increasing the present burdens of general taxation.

In my opinion, a comprehensive settlement producing these results can now be brought about only by the acquisition of the existing surface line and elevated properties by the city through the use of the special bonds which I have heretofore described and by the immediate building of subways by the city, to be operated in conjunction with those properties so acquired by the city.

If it becomes clear that a settlement cannot be brought about on that basis because the persons holding the securities of the private companies cannot agree with the city on a fair price, then it seems to me that the city will obtain the largest measure of substantial relief in the shortest time through the immediate building by the city of a rapid transit system, including subways, to supplement the existing services by the surface and elevated lines.

This municipal rapid transit system should be planned, (a) so as not to duplicate the service now rendered by the surface and elevated companies, (b) so as to make possible co-ordination with the service furnished by the Chicago City Railway, the Chicago Railways and the Chicago Rapid Transit Company if and when any or all of them shall have been acquired by the city and (c) so that the system can be extended as rapidly as the city's financial condition will permit if none of the existing systems is acquired by the city.

Mr. Blair's proposed system would be capable of carrying 2,000,000,000 revenue passengers a year and, with the service-at-cost provision, he said financiers had declared the project to be a good investment. He revealed that he has had engineers and other experts working for two years to perfect the details. He is ready to go in for full unification or to enter a partnership with the city if the elevated lines object to consolidation. Special legislation, he said, would cause some delay, after which the consolidation would be ready to go ahead with the construction outlined in two three-year periods as shown in the table in the next column.

Mr. Blair called attention to the fact that the city's $40,000,000 traction fund was obtained through the 55 per cent split of surface lines receipts paid entirely by street car patrons and said it was only fair that this money be used to construct the underground link connecting the systems.

Some of the major paragraphs in his summary read as follows:

Service at Cost.—The lines to be operated under a service-at-cost agreement between the city and the companies which will, subject to regulatory statutes, provided rates of fare adequate to produce all operating expenses, taxes, maintenance, renewals and replacements, a fair return on the capital investment, an amortization fund for city ownership at a rate to be agreed upon, fare stabilizing fund and any other proper and necessary charges arising out of the operation of the transportation facilities.

Rates of Fare.—A one-city-one-fare system with free transfers between the several types of service included; rates of fare to be automatically adjustable to the cost of the service through the operation of a fare-control fund to be set up and maintained between certain maximum and minimum limits to be agreed upon.

Right of City to Purchase.—Acquisition by the city of all of the railroad properties at any time, upon due notice, through direct purchase or through the gradual amortization of capital in favor of the city.

Reorganization.—A reorganization of the financial structures of the companies which will bring the total security issues to par with the established capital value of the properties from year to year.

Supplemental and Auxiliary Bus Service.—Provision will be made for the development of such supplemental and auxiliary service by motorbuses wherever the demand exists and conditions for its operation are suitable.

Control.—Until under the provisions of this plan the operation of the railway properties is acquired by the city, or the city purchases the properties, the control shall remain with the companies, the city to be given its representation on the board of direction when the plan becomes effective and the representation of the city on the board to be increased from time to time in direct ratio to the equity of the city in the properties.

FIRST THREE YEARS	
City-built subway on State Street, four tracks	$27,000,000
City-built subway on Washington Street from Grant Park to Union Park, two tracks	8,400,000
Elevated line construction and equipment	17,600,000
Surface Lines construction and equipment	15,000,000
Total	$68,000,000
SECOND THREE YEARS	
City-built subway on Jackson Boulevard and Franklin Street from Grant Park to a connection with the east portal of the Van Buren Street tunnel	$4,000,000
Elevated lines construction and equipment	26,950,000
Surface lines construction and equipment	7,000,000
Total	$37,950,000
SUMMARY FOR SIX YEARS	
City-built subways	$39,400,000
Elevated lines construction and equipment	44,550,000
Surface lines construction and equipment	22,000,000
Total for six years	$105,950,000
IMPROVED SERVICE RESULTING FROM ADDITIONAL DEVELOPMENT	
Present rush-hour service in business district in cars per hour:	
Surface cars	1,103
Elevated cars	1,228
Total	2,331
Improved service possible in business district in cars per hour under proposed plan:	
Surface cars	1,703
Elevated cars	3,200
Total	4,903
Increase in cars per hour under proposed subway plan:	
Surface cars	600
Elevated cars	1,972
Total	2,572
Increase in cars per hour under proposed subways and rapid-transit development	1.10%

Mayor Dever and Alderman U. S. Schwartz, chairman of the local transportation committee of the Council, revealed that they had had an oral summary of the Blair plan from Mr. Blair while the recently dissolved transit purchase conferences were in progress. Mr. Schwartz said that he told Mr. Blair then that the people of Chicago would never consent to franchises for long periods and that without the long franchises the plan could not be financed.

Mr. Insull is seeking franchises providing for $23,000,000 of additional construction, including an entirely new north and south line crossing the city a mile west of the loop and connecting with the established lines at both ends.

Twin Cities Fare to Be Settled by January

The Minnesota Railroad & Warehouse Commission has decided that its report on fares to be charged in Minneapolis and St. Paul by the Minneapolis and St. Paul street car companies will be concluded by the end of December and will be submitted by Jan. 1, according to a recent statement of Commissioner Bowen. Briefs are to be filed by the two municipal corporations and the railway corporations on Oct. 15. Later final arguments on the briefs will be presented and the commission will begin to prepare its decision.

The controversy in these cities has been going on now for practically two years. The first action was enactment by the 1923 Legislature of an act which placed rate-making powers for the railways in control of the state commission, instead of the city councils. The 6-cent rates prevailing in the Twin Cities were undisturbed when hearings began before the commission in October, 1923. In view of the issue to be decided these rates are still on a temporary basis.

Receivers at Kansas City Await Instructions on Buses

The receivers of the Kansas City Railways are effecting a crystallization of their ideas regarding bus service, and it now seems fairly certain that such service will be installed by the company. It is reported, however, that some of the bondholders do not favor ownership and operation of buses by railways in a community no larger than Kansas City. On the other hand the receivers are said to be considering various plans of operating buses. One plan of this kind is said to contemplate a service with buses in the congested area with transfers to street cars that serve outlying districts. This downtown service would take up the present overflow. A 10-cent fare would be charged, it is said, with transfers free to the street cars. The receivers are also considering the installation of bus service into residence districts and the installation of a deluxe bus for special trips or sightseeing.

The receivers consider that the officials of Kansas City, Kan., have not fulfilled the agreement they made in July to withhold consent to bus operation in compensation for additional railway service into the industrial section. The agreement was made in July. But instead of bus service being eliminated, a tentative agreement was made with a new bus company, the H. H. Moore organization, under which ten or more buses are now being operated, some cross-town in Kansas City, Kan., covering a field in which it was intended to provide additional railway service.

The receivers also consider that the city has not played fair with it by permitting buses to use the intercity viaduct. The railway pays rent for the use of the tracks on this city-owned viaduct. The buses, however, do not follow the routes of street car lines except on the viaduct. The receivers expect definite instructions from the federal court in November in regard to the extent to which they may go in the matter of installing buses.

"Read as You Ride."—The Grand Rapids Railway, Grand Rapids, Mich., in co-operation with the Grand Rapids *Herald*, has installed the "Read as You Ride" boxes in all cars and papers are furnished early morning patrons quickly and easily. The service will be daily except Sunday.

Lively Hearing in New York on Buses

Board of Estimate Finally Gets Around to Work of Publicly Considering Recent Applications—Public Gets First Chance to Air Its Views—Another Hearing Oct. 29

POLITE figures of speech lack the virility necessary to characterize properly recent political history in New York or to convey an accurate and adequate idea of the present tumult over transit affairs. Perhaps the nearest accurate picture to the current happenings is contained in Shakespeare's "Macbeth." If memory does not play us false there is a scene there in which the caldron boils and bubbles in a world of toil and trouble. Well, the transit situation in New York is something like that, only more so. In this case the Mayor of the second greatest city in the world is sitting on the lid doing his best to hold it down, but succeeding only partially.

Apparently everybody wants to run buses or pretends that he wants to run them. A semi-official count says that there are 51 applicants for bus rights, with new ones coming in every hour. More than 213 miles of routes are covered by these proposals. Not a neighborhood or section has been overlooked, except perhaps Staten Island. Staten Island is remote to most New Yorkers, but will be discovered sooner or later.

Anyway, the long deferred hearing on the bus applications was begun before the Board of Estimate and Apportionment on the morning of Oct. 22. Estimates of the number of persons in attendance vary, but a conservative opinion put it at more than 500. Extra police were on guard. Comptroller Craig sat silent throughout the whole proceedings. In fact, he read a book most of the time. The title of this he carefully guarded, but it is believed to have been "The Anatomy of Melancholy." Except for this the meeting was of the usual complexion. As the writer for the *Evening Sun* aptly put it:

"Murray Hulbert, president of the Board of Aldermen; Borough President Riegelmann of Brooklyn and the Mayor vied with each other in coining witticisms, epigrams and bromides. Some of the spectators openly growled the opinion that this was supposed to be a serious meeting, where wise decisions should be made rather than 'wise cracks.'"

To help make a long story short it can be said that the Mayor read a prepared statement. As for the proponents of the bus grants, all that were heard recommended that temporary franchises be granted by the city to the private companies and that the city abandon, at least for the present, any idea of municipal ownership and operation of buses. The Mayor said:

> Because of the vicious activities of those who have been opposed to the administration's transit policies, and because of the unnecessary hardships afflicted upon the traveling public by reason of such activities, the situation which confronts the people of the city of New York today is this:
>
> Either the duly elected responsible local officials of the city of New York must wait until a Legislature will empower them to proceed with the municipal ownership and operation of buses, which, however, from past experience does not appear to be very likely in the near future, or they must grant recapturable bus franchises to applicants acceptable to the people and the Board of Estimate and Apportionment upon terms which will permit of the taking over of such franchises when the Board of Estimate and Apportionment is legally empowered to proceed with the plan of bus ownership and operation.
>
> The Board of Estimate and Apportionment will not do anything inimical to the best interests of the traveling public. It is desirous of granting the wishes of the people in this very vexatious transit situation. A public expression of sentiment upon the disposition to be made of the bus problem will receive immediate and careful consideration of the members of the Board of Estimate and Apportionment, who are anxious to provide the immediate surface transportation service so absolutely essential to the comfort and convenience of the traveling public.

Out of this wilderness of words a public clamoring for more transportation is apparently supposed to figure out where it gets off. By liberal interpretation in some quarters this statement has been taken to mean that the city is prepared to meet the ideas advanced by the representatives of the taxpayers in attendance at the meeting. That was as far as things got. None of the representatives of the 51 individuals and corporations that have applied for franchises had an opportunity to be heard. Presumably they will have their inning at the session on Oct. 29, to which date the hearing was adjourned.

Varied Views on Transit Report

If the Mayor should adopt the policy of granting short-term franchises such action would be in keeping with the report made to the Board of Estimate by the Board of Transportation, a body appointed by the Mayor and authorized to study the transit situation. That report, abstracted elsewhere in this issue, is generally regarded as taking an advanced view of the situation and as being designed to help matters if its recommendations are followed. As to that, however, the Mayor said a few weeks ago that he did not intend to be bound by the recommendations of the report. The B.-M. T. sees that report as a good thing. G. M. Dahl, chairman of the board of that company, has indorsed the findings. So has the Citizens' Union. Well, the report says among other things that 5-cent bus fares are not always practicable and that for the present, at least, municipal ownership and operation are not feasible.

But that is only part of the story. The Broadway Merchants' Association wants the street cars off Broadway and the Forty-second Street Property Owners' Association wants the street cars off Forty-second Street. On the other hand, property owners along exclusive Park Avenue can't see the bus for a moment. They insist they will not have their thoroughfare ruined by a bus line operated in front of their doors. Falling in with some of the ideas of the Broadway Merchants' Association, the New York Railways, still in receivership, announced on Oct. 22 that it was prepared to rip up 46 miles of line at once and to substitute buses, with possible abandonment ahead of more railway lines if events justified their replacement with buses. In general the officers of that company are in agreement with the terms for operation set down by the City Transit Board. That company proposes an interchange of transfers with the cars of its railway lines, but the Mayor sees little advantage in this particular phase of the proposal because he regards the surface lines as a dead issue. Meanwhile property owners along Third Avenue are urging the demolition of the elevated line along that street.

As if this were not enough, the passages at arms are kept up between the Mayor and the Transit Commission, a state-created body. On his part the Mayor says he will petition Governor Smith for the removal of the commission under charges of culpable negligence and malfeasance in office. He is harking back to the Brooklyn accident some months ago. This may, of course, be a pre-election gesture, but Mr. Delaney, appointed to the city Board of Transportation by the Mayor, has issued a word of warning. He says that he has always found that mere argument and assertion in support of a case are not satisfactory to any trial officer.

In reply to this Chairman George McAneny of the Transit Commission made public a thinly veiled threat that he would hold responsible under the laws against criminal libel such members of the Board of Estimate as may append their signatures to the formulated charges drawn up and presented by Mayor Hylan.

Mayor Hylan the following day called the attention of Mr. McAneny to certain provisions of the Penal Law about threatening public officials who have a duty to perform. Mr. McAneny thinks the Mayor is threatening him and the Mayor appears convinced that Mr. McAneny is threatening the city officials. There the matter rested on Oct. 22.

Major-General O'Ryan, a member of the Transit Commission, replied by radio on Oct. 20 through the city's sending station to the Mayor's recent talks about transit from the same station. The cure which the commissioner recommended for the relief of the city's transit ills was the plan advanced a year or more ago by the commission for the unification of all desirable transit lines under the centralized management of a board of control, the existing franchises to be acquired by the city and the whole unified system, though not municipally operated, to become the property of the city. This project contemplates the taking over of all necessary subway, elevated and surface lines with their consent and at a valuation fixed between them and the proper authorities. The Transit Commission many months ago held protracted public hearings on this proposal and its valuations committee made an exhaustive report upon the value of the properties concerned, which, in most instances, have been disputed by the corporations as too low.

Hundreds of years ago Plato wrote about the ideal commonwealth and More wrote his "Utopia." In the light of recent events in New York humanity does not appear to be in any immediate danger.

Increased Service Imperative

Transportation Board Urges Private Bus Operation for New York City —Says City Has No Power to Run Buses

Some of Mayor Hylan's pet transit theories are knocked into a cocked hat by a report of the Board of Transportation, appointed by the Mayor himself. The commanding features of the report, submitted on Oct. 15 by that body, are private ownership and operation of buses in New York City governed by revocable franchises, granted by the Board of Estimate and recognition that it might not be practicable to demand a 5-cent fare for all lines. All the recommendations were concurred in by the three members of the Transportation Board, Chairman John H. Delaney and Commissioners, Daniel L. Ryan and William A. DeFord.

The board recommends that the city should choose one of the larger companies instead of giving grants to a large group of small operators. The report says:

> Franchises covering comprehensive systems of routes that serve a broad extent of territory are preferable to grants authorizing disconnected short routes, and so far as practicable all routes should be designed with a view to the ultimate unification in a single comprehensive city-wide system.

On this subject the board further recommends:

> Franchises should be granted to applicants that can demonstrate financial and operating solidity so that the traveling public may be adequately served and the investing public protected from exploitations.

In its proposal for a "reasonable fare" the board says:

> Franchises should stipulate a rate of fare for a continuous ride, but the conditions attending bus operation are not identical with surface or rapid transit operations and therefore a universal 5-cent fare may not be practicable in regard to all omnibus lines.

Another salient feature which deals with the possibility of eliminating some of the existing surface lines is the following provision of the report:

> Franchises for new routes should be granted only to corporations organized specifically for the purpose of operating omnibus service, and that are subject to continued control by the franchise-granting authority of the city in respect to quality of service to be rendered. Existing street railroad franchises should not be enlarged so as to include the right to operate omnibus lines, unless long-term franchises are surrendered for new grants containing conditions similar to those to be incorporated in omnibus line franchises and providing that the city authorities will have the power to require a change from street car to omnibus operation to relieve traffic congestion.

Limit on Franchise Terms

To insure eventual control of the bus lines the board declares that all franchises should embody in their terms provision that no franchise shall exceed a life of ten years; that the city reserve the right to purchase the tangible property upon a basis of valuation to be defined in the franchise-contract, when the franchise expires or is otherwise terminated, and the right of the city to control capital investments and regulate the amount and quality of service.

Other terms include audits of accounts, power to abrogate franchise if insolvency intervenes, or for failure to fulfill conditions of grants or for any change in the agreed fare.

Transfer of ownership or control or consolidation of routes is prohibited without the consent of the Board of Estimate.

Nine corporations are mentioned by the board as having proposed to establish "comprehensive systems" for which a preference is expressed. Eight of these have submitted definite plans, while the Interborough Rapid Transit Company and the New York Railways have expressed a willingness to undertake bus operation. The major applicants are:

Fifth Avenue Coach Company, Surface Transportation Company, Manhattan Bus Corporation, Service Bus Corporation, Audubon Transportation Corporation, People's Electrobus Corporation, Brooklyn-Manhattan Transit Corporation and Queens Bus Line, Inc.

The reasons for proposing recommendations as to policy are outlined by the board as follows:

> The bus is a more flexible and desirable surface transit facility than the trolley car because:
>
> A smaller capital investment, in proportion to the service rendered is required for installation.
>
> Street capacity for vehicular traffic will be increased by the ability of buses to load and discharge passengers at sidewalks without requiring other vehicles to halt.
>
> Greater safety to passengers and pedestrians will be assured.
>
> Variation of routes is always possible to avoid temporary obstruction to traffic, and better to serve the people.
>
> Rush-hour traffic can be more efficiently handled by the constant placing of equipment at the times and places where traffic is heaviest.
>
> Operations will not be slowed down or stopped if one transportation unit is disabled.
>
> Recreation facilities will be increased.

Of the 51 applications pending, 25 propose to charge a straight 5-cent fare, nine have a 10-cent fare, two ask for a combination fare of 5 and 10 cents, one recreational route asks 25 cents, another recreational route 50 cents, and 13 fail to state the fare to be charged. The applications cover practically every main thoroughfare in the city and most of the principal crosstown streets.

In the opinion of the board the imperative need is for the immediate establishment of increased service, whether to supplement rapid transit lines, to render crosstown service or furnish long-haul service.

Fares to Be Advanced in Boston

Imposition of $500,000 Additional Yearly Expenses Under Wage Award Just Announced a Serious Burden—Majority and Minority Wage Findings Reviewed at Length

BECAUSE of the award announced by the arbitration board giving the Boston Elevated Railway employees an increase in wages of 2½ cents an hour, the trustees of the company have decided to cancel all 5-cent fares in the city on Nov. 1 and install a 6-cent fare instead, except for school children, who will continue to travel for 5 cents. Five tickets will be sold for 30 cents, but the passenger who does not offer a ticket will have to pay 10 cents.

The 5-cent fare in Boston was a reduced fare, established on short runs not in real competition with the basic 10-cent fare lines. The 5-cent routes had, however, become so numerous all over the system that 1,000,000 people rode at this reduced rate last year.

The road must earn more than the extra $500,000 that the wage increase will cost, because it has been operating at a loss for three successive months. The $1,000,000 reserve fund has been completely wiped out. The net result today is that the company has a deficit of $1,200,000 to meet.

Certain additional economies will be practiced. More one-man cars will be placed in operation soon. If it is found that any of the 6-cent routes compete with the basic 10-cent fare there may be curtailment of the 6-cent routes. The 6-cent fare applies also to the company's buses.

As noted briefly in the ELECTRIC RAILWAY JOURNAL for Oct. 18, page 710. Chairman John D. McLaughlin of the board of arbitration and James H. Vahey for the union decided upon a wage of 72½ cents an hour for two-man operators, while the differential of 8 cents an hour for bus drivers and one-man car operators was continued. From these findings C. W. Mulcahy, arbitrator for the company, dissented. The opinions expressed by the arbitrators are of considerable general interest. As Messrs. McLaughlin and Vahey reviewed the matter the principal question was whether the former maximum wage, fixed by the board of arbitrators at 70 cents an hour and effective as of July 1, 1923, should be reduced to 65 cents, as the company requests, or increased to 95 cents, as the employees request, for the year ending June 30, 1925.

6,500 to 7,000 Employees Affected

In round numbers the arbitration affects the earnings of from 6,500 to 7,000 employees, of whom half, perhaps, are motormen and conductors, the other half being engaged in miscellaneous work.

It was agreed that the board need determine only the wages of the motormen and conductors of two-men cars and that the wages of all other employees, known as miscellaneous employees, be adjusted by adding to or deducting from the hourly rates of the miscellaneous employees the number of cents per hour by which the hourly rate of the blue uniform men was increased or decreased by the arbitration.

The request of the company that the wages be reduced was supported by evidence to the effect that the basic wage, judged by all reasonable standards, was excessive, and much evidence in the way of comparative statistics was introduced to support this contention. More emphasis was placed on the present condition of the company's finances;

on the fact that in its last fiscal year, from June 30, 1923, to June 30, 1924, and beginning last December, a marked diminution has developed in its receipts from passenger traffic, resulting on June 30 of this year in what would have been a deficit of more than $140,000 were it not for the receipt of income to about this amount from other and unexpected sources, and on the present trend on the part of the public toward less riding on the cars, as shown by a decrease of more than $40,000 in receipts for September, 1924, compared with September, 1923. The comment of the majority opinion on this aspect of the case follows:

The principle which applies to the relation between wages and the financial condition of employers, as generally stated by arbitration boards, by federal judges in receivership matters and by such authorities as Justice Higgins of the Arbitration Court of Australia and Chief Justice Taft when chairman of the War Labor Board, is, in substance, that the employee is not a partner or joint adventurer, sharing in profits and losses, and that his remuneration ought not to depend on these contingencies. Slightly paraphrasing a remark of one of these judges, "If the profits are 100 per cent, the fair and reasonable remuneration must be paid, and if the profits are nil it must be paid." It may be said, however, that the board does not adopt this principle *in toto* and without modification, as will appear in the ultimate decision of the case.

Public Control Act Discussed

After discussing the provisions of the act to provide for the public operation of the Boston Elevated Railway, commonly known as the public control act and under which the board of trustees was created, the majority opinion said:

It may be further said that under the provisions of this act, when, after a deficit has been borne by the public, receipts begin to exceed expenses the taxing district must be reimbursed for moneys advanced. But there is no provision for reimbursing employees whose wages have been cut in the process of reducing expenses, and have thus indirectly contributed toward bearing the deficit. It seems to us that so far, at least, as the facts in this case are concerned, the disparity between income and expenditure is not a reason for decreasing wages.

With respect to the claim that the wage itself is excessive, the majority opinion said that the questions as to what is a fair, just and reasonable wage can be answered only by applying "such standards or definite and accepted principles as seem plainly consonant with justice." The opinion said:

No one would deny, we think, that the basic wage should be sufficient to enable the employee to support his family in reasonable comfort, to maintain a normal American standard of living, according to his position in life, and as established or fixed in his own locality or community, to educate his children and to lay by something for the future in the event of sickness or death. It is, however, more difficult to apply the standard than to define it.

The eight-hour day is expressly recognized, as between the company and its employees, as the just, reasonable and basic period of labor, and the board is of the opinion that in fixing the wage rate only the amount received for six days' work a week should be considered. The present rate of pay as fixed by arbitration for the period from July 1, 1923, to July 1, 1924, is 70 cents an hour or $5.60 a day. It is true that the average wage earned is $5.94 a day for 6.46 average days a week. But these earnings evidently imply work in excess of the eight-hour period and six-day week, which, it must be conceded, are the fair criteria or norm of the justice of the wage. At the $5.60 rate for a day of eight hours, if we allow the employee fifty-two days as the equivalent of the Sundays of the year, and fourteen days in addition, as the equivalent of a vacation for that period, without any deduction for holidays, he will earn about $1,675 a year, provided nothing interferes in the way of sickness or other pressing necessity to require his absence from work. If, however, he must be absent from his work for a day he must lose a day's pay, because he is hired by the day and not by the year or the month. It is proper, however, to say in this connection, lest the fairness of the company as an employer be questioned, that employment with it is practically as permanent as the employee may desire; that the turnover is negligible in amount; that employees are not discharged except for cause, and that the working conditions are unexcelled in any city of the country, a manifest spirit of co-operation and mutual interest existing between the company and the men which could not but impress a disinterested observer.

While we think that 75 cents an hour would under more favorable conditions constitute a just and fair basic wage, in the present circumstances, giving due consideration to the present trend of the company's income and to the large total outgo entailed by an increase of even 1 cent per hour, we are of opinion that 72½ cents an hour is a reasonable hourly wage, and we accordingly fix it in that amount.

The other questions submitted to the board of arbitration concerned "free transportation," "vacations with pay," "men called when off duty," "service car motormen," "time for reporting and turning-in," "station receivers," "one-man cars and bus-service," "pay for motormen operating trains," "guards riding between cars," "temporary changes in employment," "night work," "pay for employees not assigned," "loaning employees from one division to another," and "over-time in the department of maintenance."

Concerning the pay of employees for operation of one-man cars and bus service, the board awarded 8 cents an hour in excess of the 72½ cents an hour awarded to motormen and conductors on two-man surface cars. This is the same differential which has been in effect for the past three years.

The board denied the specific request for a vacation, as well as for free transportation.

The remaining questions affect working conditions and the opinion of the majority of the board was that such questions should so far as possible be arranged between representatives of the company and the association.

It was recommended that back pay from July 1, 1924, until date when the new rates are actually put in effect be computed at the rate of 3.55 per cent of the actual earnings of each man from July 1 to the date when the new rates begin. Payment of back pay is to be made on or before Jan. 15, 1925.

Company Arbitrator's Dissenting Opinion

In the dissenting opinion of Mr. Mulcahy he said that he did not believe that the question of what is a fair and just wage should be determined in the abstract upon the basis of a theoretical budget as to how much a wage earner should have to support himself and his family according to a certain standard of living sometimes called the "American Standard," or according to one's individual ideas on the subject, without consideration of the industry involved, the conditions which it is obliged to meet, the wages paid in comparable occupations, the purchasing power of the wage as affected by changes in the cost of living, and the effect upon the other parties in interest. It seems to him that this was particularly true in the case of an essential public utility where the proper functioning of the industry was a matter of public necessity. By this he did not mean that the public may assert its interest against a particular group to deprive that group of a minimum fair living wage, but after wages have advanced beyond this minimum level it was in the interest of every one concerned, not the least of all of the employees themselves, that all these factors be considered to the end that the wage awarded might not cripple the industry or unduly restrict it in the performance of its service.

It seems to Mr. Mulcahy very plain that the imposition of the $500,000 burden which the majority award entailed was unjustified unless it could definitely be made to appear that these employees were not receiving a fair wage. It was his opinion that the men were not underpaid but, on the contrary, were well paid and were receiving on the average more than other groups engaged in comparable occupations. In his written opinion Mr. Mulcahy included a comparison to show that since December, 1914, the cost of living in Boston had advanced approximately 63 per cent, while during the same period the hourly rate of wages of the blue uniform men on the Boston system had advanced from 31½ cents to 70 cents an hour, or 124 per cent. During this period the hours of labor were reduced from nine to eight; a guarantee of a minimum pay for eight hours a day had been established; certain allowances in addition to the basic hourly rate had been increased, and the period of service required to attain the maximum rate had been reduced from six years to one. Mr. Mulcahy said that as a matter of fact the men actually worked on the average of 6.46 days a week and received an average weekly wage of $38.63 or more than $2,000 a year. He also said that a comparison of the rates of wages paid on other railways led to the conclusion that the men on the Boston system were well paid and that their wages compared favorably with those of men employed in the crafts.

He said that a year ago the wages of the Boston men were increased by a board of arbitration nearly 15 per cent so as to put them on a "fair and somewhat permanent basis," and in his opinion no changes had occurred since that time to justify an increase of the wage then awarded. In conclusion he said:

Fully appreciating the desirability of having men well paid, it must be apparent that there is a limit beyond which a group of employees in public service cannot have wages increased without working an unjust hardship upon others. The wages of these men have been advanced step by step by successive arbitration until, in my judgment, this limit has been passed.

One-Man Cars Authorized

The City Council of Macon, Ga., has recently passed an ordinance granting the Macon Railway & Light Company the right to put into service one-man cars on all lines of the city. The permission is granted with the understanding that the city shall have full control and that if two men are required to give satisfactory service, such service will be given.

Extension of One-Man Cars Refused

The Public Utilities Commission of the District of Columbia recently refused to allow the Washington Railway & Electric Company to add ten one-man cars to those it has now in operation. The decision followed a public hearing and an inspection of the new type of rear-exit one-man cars which the company has developed. The commission took no action against the one-man cars now in use, nor does its order bar future extension. It refused the extension because it was believed that one-man cars were slower than the two-men type, that the presence of the conductor meant increased protection for the riding public and greater assistance to individual riders and because there was no unusual emergency confronting the railway company at this time.

An intimation that higher fare might be asked for if one-man cars were ruled out of use was made by William F. Ham, president of the Washington Railway & Electric Company, at a recent public hearing.

Mr. Ham presented testimony to show that street car traffic is falling off rapidly on the lines of both the Washington Railway & Electric Company and Capital Traction Company. Mr. Ham said:

> I should prefer not to have to raise the rate. Whether that is possible or not I don't know. The loss of traffic has been beyond our expectations, and if it continues something is going to happen. If the commission and the public do not sustain us in trying to operate as economically as possible, I presume an increase in fare will have to be asked.

Atlanta's Jitneys Scored

The revenue figures of the Georgia Railway & Power Company, Atlanta, Ga., for the month of September fell off $47,000 compared with revenues for September, 1923. The report of the company charged this decrease in revenue to unregulated jitney bus operation and added that "continued operation of the street cars is in serious jeopardy and something must be done immediately to save the city's transportation system."

Simultaneously with the giving out of the September report the Atlanta Federation of Trade Committees issued a report following a special investigation declaring that property and rights of individuals must receive just protection and that the only position from which to view the subject was that of an adequate transportation system for Atlanta; that the jitneys do not and cannot furnish adequate transportation, but that the jitneys are meeting a need of some of the people. The committee concluded that the railway should be allowed to make a fair return on its investment and that jitney traffic should be regulated to meet the needs of those people whom the street cars are not serving. The committee stated that if the trolley cars were to run there should be the necessary protection to enable them to run at a reasonable profit after adequate maintenance expenses had been paid.

Chairman Ashley of the Federation of Trades investigating committee, brought out figures to show that in January, 1923, there were 125 jitneys licensed in Atlanta and that during that month the railway's earnings had been $12,000 in excess of the similar month the previous year. In July, 1924, the number of jitneys operating in Atlanta had increased to 362 and the earnings of the company for the month were $38,000 under the same period for the year before.

Serious Accident on Buffalo-Niagara Falls Line

Three passengers were killed, at least a score mortally injured and almost 100 were seriously injured in a rear-end collision on the Buffalo-Niagara Falls high-speed line division of the International Railway at Ellicott Creek crossing at Tonawanda, N. Y., on Oct. 19.

The three-car trains were running as the first two of two sections of an excursion carrying passengers from Philadelphia and New Jersey points between Niagara Falls and Buffalo. The six cars were demolished on a 20-ft. embankment near the bridge over Ellicott Creek.

The first section of the series of three-car trains had come to a stop because of trouble with the trolley pole. The second section was rolling along 5 minutes behind the first train with the other sections following at close intervals. The collision telescoped the second and third cars in the first section and the first car in the second section, but none of the cars plunged down the 20-ft. embankment near the creek. It took almost eight hours to clear the wreckage.

The dying and injured were removed to Buffalo and Tonawanda hospitals in more than a score of ambulances and private automobiles.

Five separate investigations are being made to determine the cause of the collision. It was believed by state police that no flagman had been sent back from the first section to stop the onrushing second section. The motorman of the second section was seriously injured, but before he lasped into unconsciousness he told company officials he did not see the stalled first section until he was too close to bring his train to a stop. The brakes of the second section had been set.

Owing to the heavy traffic Sunday on the Buffalo-Niagara Falls high-speed line, the International Railway was using the old type wooden coaches for the Philadelphia-New Jersey excursion special. The heavy all-steel cars were being used for the regular traffic. Although the wreck occurred at 1:10 o'clock in the afternoon the sharp turn in the high speed right-of-way near the point of the fatality prevented the motorman of the second three-car train from seeing objects any great distance ahead.

Employees of International Railway Engaged in Clearing Away Wreckage Caused by Collision of Cars

Governor Wants Quick Action on P. R. T. Valuation Case

The Pennsylvania Public Service Commission was recently asked in a letter from Governor Pinchot to speed its investigation of the Philadelphia Rapid Transit Company's fare case. In his communication to W. D. B. Ainey, chairman of the commission, the Governor pointed out that three weeks had elapsed since the chairman replied to the Governor's criticism of the commission's "unseemly haste" in handling the rate matter, but that so far the Attorney-General had not been asked for an opinion.

The Governor suggests that the Public Service Comission will ask the opinion of the Attorney-General right away on three points: First, whether the commission is bound in regard to valuation in the P. R. T. case by its decision of June 21, 1923; second, whether the commission is not required by the law and the decisions of the courts to reopen and consider anew from the beginning the whole question of the P. R. T. valuation, and, third, whether the commission is in any sense bound by the admissions of the counsel for the city of Philadelphia, or other complainants, concerning the valuation of the P. R. T., or whether, on the contrary, it is not required, while giving due weight to all evidence submitted, to reach its own conclusions upon the basis of its own investigations.

News Notes

Exclusive Bus Right Sought in Indianapolis.—A franchise which would exclude all other bus lines from the use of 53 principal Indianapolis streets and boulevards for a period of 25 years will be sought of the Board of Public Works and the City Council by the Indianapolis Motorbus Terminal Realty Company. This company is said to be a holding company for the Indianapolis Motorbus Terminal Company, an association comprising about 18 bus firms. An unsigned copy of the proposed franchise was left in the offices of the city legal department. It was submitted to the Board of Public Works on Oct. 13 by William Bosson, city attorney, who asked for instructions as to its disposition.

Universal Transfers in Wilmington.—Under traffic arrangements with the Tidewater Power Company a new type of transportation service operated by the Coast City Transportation Company will be inaugurated in Wilmington, N. C. Free transfers will be issued from the Coast City Transportation Company's buses to the street cars and exchange tickets will be issued from the street cars to the buses on payment of 3 cents extra. The buses have a seating capacity of 16 passengers. The chassis is built by Graham Brothers, with a Dodge engine and bodies by the Straton Bliss Company. It will require two buses to maintain a 20-minute schedule. The third bus will be kept in reserve, and also will be operated during periods of heavy traffic. One of the noteworthy facts concerning the line is that it will go out of its regular path morning and evening for two or three trips in order to take care of the high school children.

Greenville System Expands.—The Southern Public Utilities Company recently began operating a bus line in Greenville, S. C., following authorization by the City Council. The line will serve the northern section of the city not heretofore supplied with transportation service. The fare on the bus is 10 cents and free transfers will be given to all lines of the railway system. A charge of 3 cents will be made for transfers from the trolleys to the bus.

P. R. T. Wants to Operate Over Bridge.—At a meeting on Oct. 17 of the Delaware River Bridge Joint Commission, the Philadelphia Rapid Transit Company and a Camden Bus Company made franchise proposals to operate cars or buses across the bridge. The Continental Coach Company, Camden, also indicated by letter its interest in the transportation over the bridge, but made no definite offer. The P. R. T. franchise proposal was signed by Ralph T. Senter, vice-president. It said that the rapid progress in the construction of the bridge made it imperative that arrangements for carrying passengers over it should be determined upon promptly. A committee will be appointed to study the transit needs of the bridge.

Terminal Plans Announced.—A vast improvement program to be undertaken within the next year jointly by the Pennsylvania Railroad, the Philadelphia Rapid Transit Company and the city of Philadelphia was announced recently by Gen. W. W. Atterbury, vice-president of the Pennsylvania Railroad. The plans call for the construction of a passenger station west of the Schuylkill, which will mean the elimination of the present Broad Street Station, and the substitution of an underground station for suburban traffic. The plan calls for modern construction throughout, with eighteen terminal tracks for through trains and eight tracks for suburban trains. The railroad will electrify the suburban zones as far south as Wilmington and eventually portions of the New York and Schuylkill Valley divisions. General Atterbury intimated that electrification to Baltimore and Washington was also in sight. The city's share is put at $12,000,000. It is planned to start the work next year and to finish it at the end of five years.

Will Renew Wage Agreement.—The Boston & Worcester Street Railway carmen's union, which recently took a poll on the wage question, has voted to accept the offer of the company and renew the wage agreement in effect since Oct. 1, 1923. The demands called for a wage of 90 cents an hour and an eight-hour day. The first local voted to submit the issue to arbitration and arbiters had been chosen by both sides. The company primarily wanted to eliminate the 7 cents an hour extra paid one-man car operators. Subsequently, the company offered to renew the wage scale and working conditions as of the period up to Oct. 1 of the present year. The wage scale accepted provides for 58 cents an hour for motormen and conductors on two-man cars and 65 cents an hour for men on one-man cars, on a nine-hour-day basis.

Relieved from Paving.—The Virginia Corporation Commission recently handed down a decision allowing the Newport News & Hampton Railway, Gas & Electric Company to discontinue its tracks along Locust Street from Queen Street to Malloy Avenue in Newport News. It also suspended the payment of the paving obligations assessed against the company for Locust Street by the City Council until "such time as the company is operating its lines at a profit." The company was also allowed to abandon its tracks from Wood's Corner in Elizabeth City County to Buckroe Beach, but it is required to operate the car service from Wood's Corner through East Hampton into the city.

Wants Buses Off Car Streets.—Arthur Gillion of South Bend, attorney for the Chicago, South Bend & Northern Indiana Railway, has conferred with Michigan City officials in regard to enforcing a city ordinance which says buses shall not run on streets on which the street cars operate. The Jahns Bus Company, which operates from Michigan City, Ind., to South Bend, via Laporte, would be affected by the strict enforcement of the measure.

Combination Service for East St. Louis.—G. W. Welsh of the East St. Louis Railway, East St. Louis, Ill., which has applied to the St. Louis Board of Public Service for a permit to operate buses over the St. Louis Municipal Bridge, states that his company will furnish a 15-cent combination street car and bus service from any part of East St. Louis to downtown St. Louis. Permission to operate a bus line along Tenth Street in East St. Louis from Missouri Avenue to the bridge has already been obtained from the East St. Louis City Commission and the Illinois Commerce Commission. The fare across the bridge will be 10 cents with an additional 5-cent charge if the rider wants to proceed further into East St. Louis. Along Tenth Street the charge will be the same as on the East St. Louis car lines, including transfers.

Appropriation for City Survey.—The St. Louis, Mo., Board of Estimate and Apportionment has appropriated $12,500 for a survey of the city transportation needs. An additional $12,500 for this purpose will be included in next year's municipal budget. C. E. Smith, consulting engineer for the city, in urging the appropriation pointed out that the United Railways will shortly ask for a new franchise and the city should be prepared to deal with the company.

Bus Permit Under Consideration.—The Board of Public Utility Commissioners of New Jersey has reserved decision on an application by the Central Transportation Company, a subsidiary of the Trenton & Mercer County Traction Corporation, to operate two buses from Trenton, Asbury Park and Bay Head. The Coast Cities Railway, operating both trolley cars and buses, objected to the approval, claiming that the Trenton company should not be allowed to compete with it among the shore resorts.

Competition to Be Eliminated.—The New Albany, Ind., City Council recently adopted an ordinance eliminating bus competition from the railway lines of the Interstate Public Service Company. A special committee to which the measure had been referred reported that after a thorough investigation the committee decided that the city could not support a bus service and the railway service and that the railway service was more essential to the public than the service of buses.

Bus Line Planned.—The Williamsport Passenger Railway, Williamsport, Pa., is planning to operate a bus line to connect with trolley cars of the South Williamsport division, to Duboistown, to connect with Newberry cars at the postoffice, or to connect with Third Street cars. The three plans are possible, the company to accede to the wishes of patrons on each route. L. W. Heath, general manager of the company, announces that application will be made at once to the State Public Service Commission for a certificate of public convenience. Service is contemplated before the first of the year. The bus route was promised following the company's announcement that the finances were not great enough to build a trolley extension on West Third Street over the Newberry-Duboistown bridge.

Financial and Corporate

Receivership Deferred

Application for Receivers for Oklahoma Railway Continued Until January —President Reviews Situation

For the present at least the prospect of the appointment of receivers for the Oklahoma Railway no longer impends. This does not mean that the problems of the company have been solved, but rather that a start has been made on a course which gives promise for the future. In consequence the application made on behalf of the Mississippi Valley Trust Company by its attorneys for the appointment of receivers for the railway has been continued by the court until Jan. 15, 1925. Meanwhile the company will go along under the new 8-cent cash fare with two tickets for 15 cents and the other changes noted in the ELECTRIC RAILWAY JOURNAL for Oct. 11, page 665. The previous rate had been 7 cents with four tickets for 25 cents.

The entire controversy was reviewed at length by John W. Shartel, president of the railway, in the issue of the Oklahoma *News* for Sept. 29 in an article written before announcement had been made of the decision to permit the fare increase. He would prefer to run the lines on a 5-cent fare, but it could not be done successfully. He said he had no disposition to extort anything from his patrons and that his past record bore out this statement. His remarks show that on Oct. 1, 1923, the cash investment in the interurban lines was $3,031,416. The gross revenue of the interurbans for the first eight months of the year was $421,941. Operating expenses and taxes were $320,458. Gross earnings for the eight-month period were $101,483. The falling off in their receipts has been alarming this year.

In regard to the city lines, they are operating at a distinct loss. City operations proper for the first eight months of 1924 show that the gross revenue was $533,960. Operating expenses and taxes were $447,387. The gross income, above operating expenses and taxes, was $86,573. Fixed charges were $167,526. The deficit on city operations for the eight-month period was $80,963. In other words, the city lines lacked $80,000 of meeting their actual expenses, to say nothing of depreciation, dividends, or paying for necessary repairs or forced improvements.

Mr. Shartel said very frankly that in order to meet this deficit it was found necessary grossly to overcharge the interurbans to furnish current funds to live on day by day.

For 1923, the interurbans paid the city lines $99.111 for passenger fares, for which nothing but power and tracks were furnished. This amounts to 30 cents per car-mile or more than the Belle Isle and Capitol Hill street cars earn.

The interurban also operates at its own expense the suburban line from Needham to Britton, and turns over to the city lines all of the earnings between Needham and Belle Isle.

The city lines also receive their mileage pro rata on all mail, express, baggage and freight. These items alone amount to $48,637, making a total of $147,748 which the interurbans contributed to the city lines in 1923.

This rental is more than 150 per cent more than the customary rental charged by city lines for use of tracks to interurbans with which they are not associated.

This is the basis of charge by the city lines, and the same is in effect for 1924, except the proportion is slightly larger, due to the fact that there is a greater decrease in volume of business on the city lines than there has been on the interurbans.

September Operations Increase Deficit in Toledo Fund

Operations of the Community Traction Company, Toledo, Ohio, for September showed a loss of $45,654 despite operating economies amounting to nearly $38,000 and some increased revenue due to recent fare increases. The total deficit in the stabilizing fund is now $123,000 plus the orginal $400,000 in the fund. Gross revenue for September was $269,007, as compared with $301,421 for the same month last year. Operating expenses were $222,519. Actual operating cost, exclusive of extraordinary maintenance, was $194,194, as compared with $246,331 for the similar month last year. Cost of transportation was cut to $95,543, or 18.036 cents per car-mile, which is the lowest total cost for any month. This is largely due to the extended use of one-man cars and elimination of an unprofitable line.

During the last month, the report of acting Commissioner E. L. Graumlich shows, car riding dropped to its lowest point since the Milner ordinance has been in effect. The daily average was 114,383 revenue passengers. Factory unemployment, bus competition, increased use of private automobiles and the increased fare are cited as contributing causes.

During the first nine months of the year $105,000 has been set up as extraordinary maintenance to take care of renewals on the Cherry and Summit Street lines. There is a cash credit in this fund and the regular maintenance fund of $79,535 ready for the work, which will probably not go forward until next spring.

The Community Traction Company is not now earning the interest on its $7,178,000 of first mortgage bonds outstanding and will probably have to borrow money to pay the interest coupons due in January.

So far in October a gain in revenue has been shown with the first 14 days about $8,000 ahead of last month.

$50,000,000 Gross for Canada

Record Earnings, but Net Shows Decline Due to Tax Burden, Expenditures for Improvements and Bus Competition

For the first time the electric railways of Canada in 1923 had a gross income of more than $50,000,000. Despite this fact, however, the roads were unable to show better dividends for shareholders, or, in the case of publicly-owned roads, to return better surpluses to the citizens. Factors that worked against the companies were the increasing tax burden and the necessity of spending millions on new equipment and extensions that increased interest charges without increasing revenues in the same proportion.

Of 64 railways only nine paid dividends. However, 20 Canadian roads are publicly owned. Of the 64 companies 15 showed operating deficits, and, after paying all charges, 40 showed corporate deficits.

USE OF ONE-MAN CARS GROWING

According to the annual report of the Dominion Bureau of Statistics, one-man cars are coming into quite common use. In fact, more than one-tenth of the 5,000 street cars in Canada are one-man cars.

Comparative figures of income and deductions of Canadian street railway systems are given for two years past:

	1922	1923
Earnings and Income:		
Gross earn. from operations	$49,660,485	$50,191,387
Operating expenses	35,986,871	36,171,922
Net operating revenue	13,673,513	14,019,464
Miscellaneous income	4,195,536	3,940,663
Total corporate income	17,869,149	17,960,128
Deductions from Income:		
Taxes	1,730,718	1,958,045
Interest—funded debt	6,545,825	6,765,078
Interest—floating debt	816,406	1,094,822
Other deductions	1,467,251	1,776,176
Total deductions	10,560,202	11,594,122
Total net income	7,308,947	6,366,005
Deductions from Net Income:		
Reserves, etc.	4,664,822	4,589,081
Dividends	2,554,567	2,322,561
Total	7,219,389	6,911,643
Deficit	*$89,557	$545,637

* Surplus.

In commenting on these results the *Canadian Financial Post* says that in the operation of suburban lines, particularly around large urban centers, the bus has grown to be an important factor. This is particularly true around Toronto, where the buses compete with Hydro Radials. Recently a new tariff of license fees has been put into force by the Ontario Works Department. The contention is that the buses are using the provincial highways for gain and should pay adequate fees. The bus men claim that the tax levied is such that it will force them out of business. They say that it is not an equitable tax, inasmuch as it is not on the same basis for all bus lines, and contend that the buses in direct competition with Hydro Radials are being taxed so high and in such an arbitrary manner as to prevent them giving adequate service.

Alabama Traction Deal Approved

Stockholders of the Alabama Traction, Light & Power Company have approved the sale of the common stock and other securities which it owned in the Alabama Power Company to the Southeastern Power & Light Company, the American company recently organized for the purpose of taking over those holdings.

In a statement issued by Thomas W. Martin, president of the Alabama Power Company, it is explained that under the plan the common and preferred stock of the Canadian company will be converted into the common and preferred of the American company. The new company assumes the payment of all the obligations of the Canadian company, including the interest on the bonds at maturity. It was said that about 90 per cent of the common stock of the traction company is now owned by American citizens.

Will Foreclose Mortgage Against Titusville Property

Announcement was recently made that the holders of the bonds and mortgage against the property of the Titusville Traction Company, Titusville, Pa., have decided to foreclose. Without formal court proceedings the property will be advertised at trustees' sale. No interest has been paid on first mortgage bonds since January, 1920, nor on second mortgage bonds for the past ten years. The company, because of the increasing use of the automobile, has been unable to keep up the business. Recently only one car has been operated and that over the line between Pleasantville and Hydetown.

The line is 16 miles long. It was organized 27 years ago by the late M. B. Dunham, Warren. The first section of the line was built between Titusville and Pleasantville.

Illinois Farmers Do the Trick

After six weeks of operation in the control of 300 farmer-owners, the Fox & Illinois Union Railway, in Illinois, has announced a net profit of $24,000. The sharp contrast of the $8.40 gross profit for the first seven months of 1924 as shown by the Illinois Commerce Commission brought out the source of the recent big income as a $23,000 contract for power lines along the right-of-way.

For its entire life of eleven years the road has been a losing proposition, and when the farmers took it over recently for $89,000 they did so to keep it from being junked. They paid $25,000 cash, raised by an assessment of $2.50 for each acre owned by the farmers it served. It is the only freight outlet for five co-operative grain elevators owned by the same farmers, and although the junk value was placed at $117,000, the former owners took the farmers' bid as the best of several submitted.

The power right-of-way was sold to the Public Service Company of Northern Illinois, an Insull corporation. Mr. Insull agreed to receipt a bill for $8,000 for power, assumed in the purchase, and to pay $15,000 cash.

The line is 21 miles long yet passes through no incorporated town or village. The 300 owners have agreed to pay ½ cent bonus for each bushel of grain they ship, in the hope that the line can be extended 9 miles into the untapped Millington, Ill., district, where a large silica sand bed awaits development. The grain bonus will bring in $10,000 a year.

Pennsylvania Line to Be Sold at Auction

The trolley road of the Pennsylvania & New Jersey Traction Company, running from Morrisville, Pa., to New Hope, Pa., and Lambertville, N. J., will be sold at public auction on Nov. 17, in Philadelphia, to satisfy a claim for interest on a mortgage for $200,000. The mortgage is held by the Northern Trust Company, Philadelphia. The traction company is charged with default in payment of interest on the mortgage for 90 days. The sale will also include rolling stock consisting of five passenger cars, one freight car, three work cars, two snow plows and parcels of land in New Hope and Newtown. Cars are still running between Trenton and Morrisville, Pa., and Yardley, Pa., and from Trenton to Princeton, N. J.

Hearing Begun on Suit to Compel Eastern Massachusetts Dividend Payments

The case of L. Sherman Adams against the trustees of the Eastern Massachusetts Street Railway, Boston, Mass., to compel the payment of dividends on adjustment and common shares is on trial before Hon. Frederic H. Chase as master. In opening the case Boyd B. Jones, attorney for the plaintiff, outlined the claim of the plaintiff and referred to the books kept by the defendants and their reports to the Public Service Commission in their answers to interrogatories filed to them in the case. These, Mr. Jones asserted, abundantly supported the plaintiff's contentions.

Caleb S. Jackson, vice-president and treasurer of the railway, said that personally he did not believe the trustees had a legal right to resort to reserve fund for payment of dividends. He was not sure whether the matter of applying the reserve to this purpose was discussed at the time of making up the answer to an interrogatory in which the trustees said they had paid such dividends as had been earned, nor could he recall whether said trustees in January, 1923, when dividends on preferred and sinking fund stocks were decided upon, discussed such application of the reserve fund. The trustees did, however, discuss resorting to the reserve fund to pay dividends at various times.

Some time in September, 1922, the fund first appeared on the company's books. Mr. Jackson himself created this fund with the approval of the trustees. Some of the latter were decidedly of the opinion that the reserve fund was not applicable to the payment of dividends. It was the general opinion of the trustees that dividends on preferred and common stocks were included in cost of service. In substance, the trustees knew the fund was applicable to meet deficiencies in income in order to cover the cost of operation.

Mr. Adams is a Boston dealer in investment securities. He has on several occasions recommended the purchase of Eastern Massachusetts securities to investors.

Conspectus of Indexes for October, 1924

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Electric Railway Engineer

Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	Oct. 1924 **7.15**	Sept. 1924 **70.8**	Oct. 1923 **6.95**	May 1921 **7.24**	May 1923 **6.88**
Street Railway Materials* 1913 = 100	Sept. 1924 **151.4**	Aug. 1924 **152.6**	Sept. 1923 **163.2**	Sept. 1920 **247.5**	Sept. 1924 **151.4**
Street Railway Wages* 1913 = 100	Oct. 1924 **221.9**	Sept. 1924 **221.4**	Oct. 1923 **217.5**	Sept. 1920 **232**	Apr. 1923 **207.3**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Sept. 30 1924 **3.47**	Aug. 31 1924 **3.29**	Sept. 30 1923 **5.04**	July 31 1920 **11.12**	July 31 1924 **3.19**
U. S. Bank Clearings Outside N. Y. City (Billions)	Sept. 1924 **15.90**	Aug. 1924 **15.25**	Sept. 1923 **14.59**	Mar. 1920 **18.54**	Feb. 1922 **10.65**
Business Failures Number	Sept. 1924 **1,276**	Aug. 1924 **1,432**	Sept. 1923 **1,279**	Jan. 1924 **2,231**	Sept. 1924 **1,276**
Liabilities (millions)	**26.95**	**40.96**	**30.83**	**122.95**	**26.95**

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	Oct. 1924 **207.6**	Sept. 1924 **211.2**	Oct. 1923 **220.3**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Sept. 1924 **148.8**	Aug. 1924 **149.7**	Sept. 1923 **153.7**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Oct. 1 1924 **13.00**	Sept. 1 1924 **12.81**	Oct. 1 1923 **13.10**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's Wholesale Commodities 1913 = 120.9	Oct. 1 1924 **190.9**	Sept. 1 1924 **188.7**	Oct. 1 1923 **190.9**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Sept. 1924 **146.8**	Aug. 1924 **144.2**	Sept. 1923 **149**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Sept. 1924 **163.7**	Aug. 1924 **162.8**	Sept. 1923 **163.4**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

Albany Southern Railroad Changes Name

The rearrangement of the capital structure of the Albany Southern Railroad, Albany, N. Y., and a change of name to the Eastern New York Utilities Corporation has been decided upon by the directors and approved by the stockholders. New financing of a comparatively small amount is contemplated by the sale to stockholders of a new prior preference stock of no par value which has just been authorized and issued.

The new stock has been authorized in the amount of 25,000 shares, to have preference over the existing common and preferred stocks, but only 3,000 shares of the issue is to be sold at this time. Stockholders of record, Oct. 18, will be permitted to subscribe for the new prior preference shares at $95 a share in the ratio of 8.814 per cent of the present holdings. The proceeds of the sale of stock will be used to pay floating indebtedness incurred for extensions, additions and betterments and to pay for further capital improvements.

The company operates 60.9 miles of third-rail railway and does a general power and lighting business.

Maumee Valley Line Will Be Abandoned

The Maumee Valley Railway, Perrysburg, Ohio, now in the hands of Receiver B. A. Webster, has been granted permission by the State Public Utilities Commission to abandon its lines. The west side line to Maumee will be abandoned at once and the east side line to Perrysburg will cease operating as soon as the new bus equipment of the Maumee Valley Transportation Company can be put into service. There were $345,000 of first mortgage bonds outstanding against the railway property.

The same interests have formed the new bus company to take the place of the former belt line railway. The commission has authorized the new bus line to do business on the east side of the river, but has withheld a certificate of convenience and necessity for the line on the west side because of present competition between bus lines already operating there and the Toledo, Bowling Green & Southern Traction Company's line.

Abandonment of Routes Approved by City. — Permission for the Oklahoma Union Railway, Oklahoma City, to surrender franchises for the Forest Park and Fife Place lines has been given by the City Council, subject to the approval of the Corporation Commission.

Personnel of Common Stock Committee Announced.—Howard Cook, Jefferson City, Mo., vice-president of the Central Missouri Trust Company, has been named by the holders of the common stock of the United Railways, St. Louis, as a member of a committee to represent the stockholders in negotiations with New York financial interests engaged in managing the present reorganization. The committee named consisted of Judge Fred L. English, Edward C. Singleton, president of the Missouri State Life Insurance Company, and Mr. Cook, with the Mercantile Trust Company, St. Louis, as depository. This committee has been named by virtue of an agreement among the holders of this stock to organize and vest all of their privileges and powers as stockholders in the committee for the protection of the interests of the holders. The common stock consists of 249,130 shares, a large portion of which is owned by the North American Company.

Approval of Refunding Issue Is Sought.—The Twin City Rapid Transit Company, Minneapolis, Minn., was authorized recently by the Railroad & Warehouse Commission to have its subsidiary, the Minneapolis Street Railway, issue $5,000,000 of 5½ per cent refunding notes to be dated Nov. 1, 1924, and due Aug. 15, 1928, to redeem $5,000,000 of extended first mortgage bonds issued jointly by the Minneapolis Street Railway and the Minneapolis, Lyndale & Minnetonka Railroad. As noted in the ELECTRIC RAILWAY JOURNAL for Oct. 18, page 715, the issue was recently sold to Dillon, Read & Company, New York.

Long Island Property Will Be Auctioned.—Property of the New York & North Shore Traction Company will be sold at auction Oct. 29 at the company's carhouse in Flushing, L. I. Several years ago the company operated between Flushing and Whitestone, Bayside and points in Nassau. The power plant and machinery at Douglaston, the carhouse in Flushing, private rights-of-way in a plot of ground in Whitestone will be disposed of.

Purchase Negotiations Considered.—A basis to negotiate either for the purchase of the Hamilton Street Railway System, Hamilton, Ont., or the renewal of its franchise was reached at a conference recently between officials of the city and of the company. No proposals were set forth by either group. All the city asked for was a definite proposal from the company so that the question might be submitted to the rate payers at the forthcoming municipal elections.

Vote to Take Over Company.—Stockholders of the Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., at a recent meeting voted to take over the Chicago, North Shore & Northern Railroad. The latter company was organized to construct the extension line between the right of way of the Chicago Rapid Transit Company and Niles Center, a distance of 5½ miles. The capitalization of the Chicago, North Shore & Northern was nominal.

Allowed to Abandon Passenger Service.—The California Railroad Commission has granted permission to the Visalia Electric Railroad to discontinue passenger train service from Visalia, Woodlake and Elderwood via Exeter and Lemon Cove, Tulare County. The company showed an operating loss of $50,000 a year for several years.

Wants to Abandon an Interurban Line.—The Olean, Bradford & Salamanca Railway has applied to the New York Public Service Commission for permission to abandon its interurban division between Salamanca and Little Valley, a distance of 8 miles. The company says the line cannot be operated at a profit. The commission will hear the application at Hornell, N. Y.

Sale of Power House Reported.—The sale of the Holyoke Street Railway power house on the bank of the Connecticut River near the Berkshire Street grounds at Holyoke, Mass., to the Turners Falls Power & Electric Company is said to have been definitely arranged. The transaction means a reported saving of about $50,000 to the railway in operating expenses. It is also said to mean the purchase of power for railway purposes from the Turners Falls Company.

Line Being Dismantled.—The Alamance Street Railway, Burlington, N. C., has abandoned operation and is now being dismantled. Early in the present year J. H. Bridges was appointed receiver as a result of defaulted payment of interest on $120,000 in bonds held by the petitioner. The receivership order was signed by Federal Judge E. Yates Webb on petition of the American Trust Company of Richmond, Va. At that time the receiver was authorized to continue the operation of the line connecting Burlington, Graham and Haw River. The railway is 8 miles long.

Properties Purchased. — The Public Utilities Commission has authorized the Ohio Public Service Company, Cleveland, to purchase the properties of the Sandusky Gas & Electric Company, the Port Clinton Electric Light & Power Company, the Northwestern Ohio Railway & Power Company and the Central Ohio Gas Company for $13,725,000, subject to present incumbrances. The commission also authorized the Ohio Public Service Company to issue $4,800,000 of 7 per cent preferred stock, $2,525,000 of common, $8,000,000 of 5 per cent first mortgage bonds and $1,000,000 of 5 per cent mortgage bonds.

$200,000 Verdict Against Denver Tramway.—The United States Court of Appeals sustained the city of Denver in its effort to collect approximately $200,000 from the Denver Tramway, money owed the city as a franchise tax. When the city sought to collect the tramway presented a signed agreement by the former Mayor of Denver that the city would allow the tramway $50,000 for the work it would do on the new viaduct at Sixteenth Street. It is understood that the $50,000 deduction from the taxes owed will cover labor and material as used by the tramway. If that be true, then the tramway gets the right-of-way over the viaduct and pays nothing toward the construction. The use of the viaduct by the tramway is essential to safe and fast operation.

Describes Property's Progress. — H. M. Byllesby & Company, Chicago, Ill., has issued an illustrative pamphlet describing the extent and growth of the properties of the Standard Gas & Electric Company and telling of its advantages as a utility investment. A map is included showing the territory served with electric lines, hydro-electric plants, telephone lines and electric railway service.

Personal Items

F. A. Cummings Vice-President

Former Newspaper Man Appointed to Executive Office with the Eastern Massachusetts Street Railway

Fred A. Cummings, who left the Boston newspaper field in 1919, to become public relations representative for the Eastern Massachusetts Street Railway, Boston, Mass., has been appointed a vice-president of the company. Since September last year he has been assistant to the chairman of the public trustees.

As just indicated, Mr. Cummings was formerly a newspaper man. In recent years it seems almost to have become the fashion for newspaper men to go into electric railway work just as in the past they have gone into other callings, particularly banking. Offhand, a score or more of similar instances are recalled. Notable among them are the cases of Fred Buffe, J. V. Sullivan, Ross Schram, J. W. Colton, John L. O'Toole and Paul Shoup. As journalists, all of these men know that you cannot live on yesterday's reputation. If your star is to continue high in the firmament you must be constantly up and doing.

What is the answer to the success that usually attends the newspaper man who enters another calling? Perhaps more than anything else it is the lesson of loyalty that he early learns. Certainly if there is any department of life in which the proverb "a good name is rather to be chosen than great riches," it is in newspaper work. It was H. H. Kohlsaat, former publisher of the Chicago *Record-Herald*, who died a few days ago, leaving the impress of his personality indelibly written on the pages of the history of American journalism, who said: "There is no place in journalism for the man who would break a confidence." Newspaper men err, but never guiltily.

Mr. Cummings entered railway work steeped in the ethics of journalism. He was formerly a special writer on the Boston *Globe* and before that was a member of the staff of the Lynn *Item*. He knew the state of the public mind, and so when the work of rehabilitating the road was begun his help and advice were sought. The Boston *Herald* once said that when the new era of railway management arrived in the Eastern Massachusetts Street Railway under public control the men selected to rehabilitate the property "looked around for a man who had spent his years finding fault with the system and they naturally turned toward Cummings." That is only partially true.

Anyway, Fred Cummings entered upon his work with all the fealty that is the newspaper man's. He told the trustees what he thought and he told the public what he thought. The public and the trustees winced in turn. There is one thing about it. Fred Cummings is progressive. And he is militant. More than one local politician has been brought down impaled upon the winged words of the man who knows bunk when he hears it and isn't afraid publicly to call a spade a spade.

Fred Cummings has worked unremittingly to have the railroad serve the best interests of the people who pay the fares, and to have the people cooperate with the trustees. As a result he has absorbed since 1919 a wide fund of knowledge of other departments from the intimate contacts which he has had to preserve with them, and so he goes into his new post not technically trained in the engineering sense, but with a far richer fund of all-around experience than it is often possible for the technically trained man to acquire in a similar length of time. In addition he is fortified with a keen recognition of the broad problems which the executive is constantly being called upon to meet.

Frank I. Hardy has resigned as manager of the Chelsea District of the Eastern Massachusetts Street Railway, Boston, Mass., to accept a position with the Boston & Maine Railroad. Mr. Hardy has been connected with the Eastern Massachusetts Street Railway since 1919. At that time he succeeded Timothy A. Donohue in charge of the Salem division. Mr. Hardy has been in the electric railway business since 1900. He has in the past been connected with the Union Traction Company of Indiana, the Fort Wayne & Northern Indiana Traction Company, the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway. He was also at one time general superintendent of railways of the Northern Ohio Traction & Light Company, Akron, Ohio.

F. J. O'Donoghue, manager of the Haverhill Division of the Eastern Massachusetts Street Railway, Boston, Mass., has been transferred to manage the Lowell Division. The duties of Garfield S. Chase, manager of the Lawrence Division, will be extended to include jurisdiction over the Haverhill Division.

Maurice E. McCormick, manager of the Lowell Division of the Eastern Massachusetts Street Railway, Boston, Mass., has been promoted to the position of manager of the Chelsea Division, including jurisdiction over the Melrose-Woburn Division.

George H. Whitfield has accepted the position of director of public utilities of Richmond, Va., succeeding E. W. Trafford who has served in that capacity since 1919. Mr. Whitfield is well known in Richmond, having served as engineer for the Virginia Railway & Power Company during the reorganization period in 1902. He was serving as engineer of the New Jersey Department of Institutions and Agencies when he received the present appointment.

H. F. Fritch Joins Boston & Maine Railroad

Howard F. Fritch, assistant general manager of the Eastern Massachusetts Street Railway, Boston, Mass., has been appointed assistant to Homer Loring, chairman of the executive committee of the Boston & Maine Railroad. It was Mr. Loring who was mainly responsible for the successful rehabilitation of the Eastern Massachusetts property and in that work, under him, Mr. Fritch took no small part. While the Boston & Maine is primarily a steam railroad the system does embrace a number of important electric railway properties and several bus lines.

Mr. Fritch has been connected with the Eastern Massachusetts Street Railway and its constituent companies since 1910. In June that year he entered the employ of the Boston & Northern Street Railway, one of the underlying companies that later went to form the Bay State Street Railway, the forerunner of the Eastern Massachusetts Street Railway. His first work was in the time-table department, then being organized. The scope of this department was later enlarged to include traffic studies and the compilation of statistics in connection with labor matters and fare cases.

For several years Mr. Fritch was assistant in active charge of the department, and in 1916 was placed in charge as superintendent of the traffic department. With the formation of the Eastern Massachusetts Street Railway he was made assistant general manager in charge of transportation. Then was evolved the plan of separating the system into units, each to be self-contained, with a local district manager in charge. In the capacity of assistant general manager Mr. Fritch worked in close co-operation with the managers of the several self-contained local units so as to make each of them successful under the conditions that obtained in its particular locality.

Mr. Fritch was graduated from the Worcester Polytechnic Institute in electrical engineering, class of 1910. He was born on Sept. 24, 1888.

New Head of Canadian Suburban Electrics

D. E. Galloway has been appointed assistant vice-president in charge of a number of suburban electric lines of the Canadian National Railways. Mr. Galloway is a native of Hamilton, Ont., and joined the Grand Trunk Railway in a clerical capacity in that city in 1901. He later served in various clerical positions in Montreal until June 1, 1906, when he became private secretary to the second vice-president and general manager. In 1911 Mr. Galloway was appointed assistant to the president and became assistant vice-president in 1922. When Sir Henry Thornton assumed his duties as chairman and president of the Canadian National Railways, Mr. Galloway was appointed chief assistant to the president. The companies which will come under Mr. Galloway's charge serve a large territory in the neighborhood of Montreal and Toronto.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Improvements Planned

Program of Rehabilitation for Madison to Cost $898,370—Twenty-nine Cars to Be Purchased

Representatives of the city of Madison, Wis., the Wisconsin Railway Commission and the Madison Street Railways recently held a joint meeting to consider the tentative program of street paving and street railway improvement which the Madison Railway is to fulfill for the next six years.

The committee which drafted the program consisted of: C. M. Larson, chief engineer; G. C. Matthews, chief statistician of the Railway Commission; Dudley Montgomery, vice-president; Warren Montgomery, treasurer; J. S. Allen, consulting engineer; E. J. Schuring, attorney for the Madison Street Railways Company; J. H. Brown, T. J. Ross and E. E. Parker, city engineer, for the city of Madison.

The total cost of all of these additions and improvements is estimated at $898,370, of which $690,740 is the Madison Street Railways' share and $207,630 is to be borne by the city of Madison. A committee of the Council is now working to embody the plan in an ordinance. It is the intention to complete the above work by 1930.

The features of the plan as agreed upon by the committee, listed in the order of importance, are as follows:

1. Rebuild and pave 300 ft. of single track at Highland and Regent Street.
2. Resurface and pave 600 ft. of single track on West Washington Avenue.
3. Rebuild and double track Atwood Avenue, including 5,600 ft. of single track, two crossings, one turnout.
4. Purchase 17 new cars and scrap 9.
5. Rebuild and pave 2,500 ft. single track and resurface and pave 1,000 ft. of single track on Williamson Street.
6. Resurface and pave 520 ft. of double track on Jenifer Street.
7. Replace track layout at carhouse and add new trackage and construct new storage shed.
8. Resurface and pave 785 ft. of double track on North Hamilton Street.
9. Rebuild and pave 1,950 ft. of double track, resurface and pave 400 ft. of single track and rebuild and pave 4,600 ft. of single track, overhead, crossings, turnouts, curves on Breeze Terrace and Monroe Street.
10. Resurface and pave 700 ft. of double track, resurface and pave 3,000 ft. of single track and pave 700 ft. of double track and build and pave 2,100 ft. of single track on Oregon Road.
11. Rebuild and pave 3,200 ft. single track, eight turnouts, twelve curves on four sides of Capitol Park.
12. Build and pave 4,350 ft. of double track with overhead for same on University Avenue.
13. Purchase 12 new cars and scrap 5.
14. Resurface and pave 3,700 ft. double track, two curves on Jenifer and Baldwin Streets.
15. Resurface and pave 1,500 ft. double track, resurface and pave 3,800 ft. single track, build and pave 3,800 ft. single track, four curves and four crossings on Mills and Emerald Streets.
16. Resurface and pave 2,700 ft. single track, rebuild and pave 2,700 ft. single track, two railroad crossings, one crossover on Winnebago and Atwood Streets.
17. Resurface and pave 2,800 ft. single track, build and pave 2,200 ft. single track on East Johnson Street.
18. Rebuild and pave 1,500 ft. single track, resurface and pave 2,400 ft. single track, build and pave 1,500 ft. single track, build and pave 2,400 ft. single track on Winnebago and West Main Streets.

Big Increase in Use of Wood Preservatives

That the year 1923 was a banner year in the wood preserving industry is shown by figures compiled by the Forest Service, United States Department of Agriculture. More treating plants were in active operation and the quantities of material treated as well as preservatives used were larger than ever before reported for any of the 15 years for which these statistics have been compiled. During the year 135 treating plants, or seven more than reported in 1922, were in active operation. They treated a total of 224,375,468 cu.ft. of wood, representing an increase of 57,755,121 cu.ft., or 34 per cent, over the 166,620,347 cu.ft. reported the year previous.

Increases were registered in 1923 over the quantities reported in 1922 in each of the seven classes of material treated, the largest occurring in cross-ties and poles in the order given. Of the former there were treated a total of 160,830,525 cu.ft., or 36,881,103 cu.ft. more than in 1922. In the case of the latter the total was 26,886,904 cu.ft. and the increase amounted to 9,878,264 cu.ft.

The preservatives used in the treatment of wood in the United States in 1923 consisted of 127,417,305 gal. of creosote, 1,570,932 gal. of paving oil, 28,830,817 lb. of dry zinc chloride and 4,706,968 gal. of miscellaneous preservatives. Zinc chloride was the only one of the four classes of preservatives used that did not show in 1923 an increase in the quantity used over that reported the previous year.

The 127,417,305 gal. of creosote used by the treating plants in 1923 represent an increase of 41,095,916 gal., or 48 per cent, over the quantity consumed in 1922. The consumption of paving oil was greater by 156,250 gal. and the quantity of miscellaneous preservatives used was more than double the amount reported in 1922. As mentioned above, the zinc chloride consumption was less in 1923 than it was in 1922, the decrease in consumption amounting to 1,037,822 lb.

Ever since the compilation of these statistics started in 1909 cross-ties have constituted the bulk of the material treated each year, because the wood preservation industry has been built up largely upon treated wood for railroad use, principally ties.

In 1923 out of a total of over 224,000,000 cu.ft. of wood that were subjected to preservative treatment more than 160,000,000 ft., or 71 per cent, were cross-ties. The actual number of ties was 53,610,175, or 12,293,701 more than in 1922. Although both electric and steam railroads are users of treated cross-ties, the latter employ the bulk of such material. The number of ties for electric railways that were treated during the year was 564,968, and of this number 20,106 were bored, 28,500 were both adzed and bored and 516,362 were neither adzed nor bored. The cross-ties intended for use on steam railroads numbered 53,045,207, consisting of 2,084,841 adzed, 793,776 bored, 3,045,496 that were both adzed and bored and 47,121.094 that were neither adzed nor bored.

The relative quantities of ties treated by different processes since 1909 are shown in an accompanying table.

CROSS-TIES TREATED IN THE UNITED STATES BY YEARS (CUBIC FEET)

	Creosote	Zinc Chloride	Zinc-Creosote	Miscellaneous	All Preservatives
1909	29,830,080	24,153,162	8,095,794	(a)	62,079,036
1910	44,525,229	27,587,583	6,354,219	(a)	78,467,031
1911	49,532,163	28,337,883	7,312,374	(a)	85,182,420
1912	57,461,515	28,532,874	8,214,303	2,974,317	97,183,009
1913	75,998,307	36,051,816	6,938,838	1,792,287	120,781,248
1914	67,774,329	50,020,755	5,868,834	7,877,043	131,540,961
1915	51,231,207	53,457,852	6,548,136	19,560	111,256,755
1916	62,576,403	43,859,028	5,935,242	37,431	112,408,104
1917	48,685,554	44,529,954	6,482,046	680,856	100,378,410
1918	34,638,147	51,166,146	6,023,334	(a)	91,827,627
1919	44,938,215	58,912,323	8,850,222	3,021	112,703,781
1920	40,114,551	87,398,160	7,414,866	35,019	134,962,596
1921	66,139,398	90,797,841	9,183,702	29,604	166,150,545
1922	60,625,086	52,254,303	11,045,913	24,120	123,949,422
1923	104,167,710	46,138,005	10,507,173	17,637	160,830,525

(a) No statistics.

Interborough Orders 150 New Steel Cars

The Interborough Rapid Transit Company, New York, N. Y., notified the Transit Commission on Oct. 22 that it had let a contract for 150 new steel subway cars, the last of the 350 required under the commission's orders, to meet increasing traffic demands. The cars will be made by the American Car & Foundry Company and will cost about $4,000,000.

The additional cars were called for in the commission's orders for May, 1922. The first 100 new cars were put in service a year ago. Seventy-two of the second 100 have been delivered and the remaining 28 will be available in November. Deliveries under the final order, beginning in February, will be completed by next fall.

The company has financed the purchases largely with car trust certificates. The new cars, together with additions to power plants necessitated by the increased car service, involve a total expenditure of about $11,000,000. Completion of the program will give the Interborough 2,277 cars, an increase of 19.2 per cent over the number in operation in 1921. The order for the electrical equipment of the new cars

has been awarded to the General Electric Company.

The original order for the 350 additional cars was referred to in the ELECTRIC RAILWAY JOURNAL, issue of May 6, 1922.

Metal, Coal and Material Prices

Metals—New York	Oct. 21, 1924
Copper, electrolytic, cents per lb.	13.25
Copper wire base, cents per lb.	15.125
Lead, cents per lb.	8.40
Zinc, cents per lb.	6.75
Tin, Straits, cents per lb.	51.625
Bituminous Coal f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$4.425
Somerset mine run, Boston, net tons	2.05
Pittsburgh mine run, Pittsburgh, net tons	1.875
Franklin, Ill., screenings, Chicago, net tons	1.375
Central, Ill., screenings, Chicago, net tons	1.175
Kansas screenings, Kansas City, net tons	2.00
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	$6.25
Weatherproof wire base, N. Y., cents per lb.	17.75
Cement, Chicago net prices, without bags	2.20
Linseed oil (5-lb. lots), N. Y., per gal.	$1.08
White lead, in oil (100-lb. keg), N. Y., cents per lb., carload lots	0.12
Turpentine (bbl. lots), N. Y., per gal.	0.85

Rolling Stock

South Carolina Gas & Electric Company, Spartanburg, S. C., has ordered nine new buses from the White Company.

Brooklyn City Railroad, Brooklyn, N. Y., is sending out specifications for cars similar to the lot ordered last year, namely, four-motor, double-end cars with center exit. The number of cars to be purchased has not yet been determined.

Track and Line

Grand Rapids Railway, Grand Rapids, Mich., is making preparations with the city of Grand Rapids for the laying of new track on at least a half mile of Division Avenue and the paving between the tracks. The work would be begun next summer. Division Avenue, now a main artery, the city hopes soon to make a 100-ft. street. To facilitate operating conditions in the downtown section the company this fall will construct a new wye at Michigan Street and Monroe Avenue, the cost to be about $15,000 and the work to be completed in three weeks after starting.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., started work on the relaying of tracks on South Eleventh Street from Mitchell Avenue to Garfield Avenue on Oct. 1. This is an important reconstruction job with practically a mile of double track to relay. In this work 672,000 lb. of steel rails will be used. The cost of the rails alone will be nearly $20,000. For this work approximately 1,500 steel ties will be used. They will cost $10,650. Altogether about $50,000 will be spent in St. Joseph for material and supplies.

Washington Railway & Electric Company, Washington, D. C., has agreed to spend $105,000 in laying a new set of tracks for the Georgetown and Tennallytown line, in the center of Wisconsin Avenue. The District has agreed to allot, out of the $350,000 appropriated by Congress for the paving, the sum of $64,000 toward the trackwork.

Grays Harbor Railway & Light Company, Aberdeen, Wash., has announced the resumption of through service to Cosmopolis. The company has expended $14,500 laying new tracks and is contemplating considerable work on the Aberdeen-Cosmopolis line. The company has applied to the City Council for permission to place a single track across the new Wishkah River bridge.

Pacific Electric Railway, Los Angeles, Cal., has completed the extension of its line from the foot of East Second Street, Long Beach, to Naples Junction. The extension is more than 1½ miles in length. The Belmont Shore Company donated the right-of-way through its tracts and contributed $63,000 toward the cost of the line's construction.

Boston, Mass. — Construction work will begin soon on the new rapid transit line in Boston, from Andrew Square to Mattapan. The Boston Elevated Railway has signed an agreement with the city of Boston Transit Department for the lease and operation of this new line when it is completed. Bids were asked Oct. 20 by the Transit Department for the construction of the first section, out of Andrew Square. This is a tunnel section, and the excavated material will be used for fills at other points along the route. A part of the route will be the Shawmut branch of the New York, New Haven & Hartford Railroad, which was bought for $950,000. The railroad stations that will be discontinued are Field's Corner, Shawmut, Ashmont, Cedar Grove, Milton, Central Avenue and Mattapan.

Third Avenue Railway, New York, N. Y., is reconstructing 1½ miles of double track on Broadway from 242d Street to the Yonkers city line. The new construction is with 7-in., 122-lb. standard A.E.R.E.A. grooved girder rail on new creosoted ties with welded joints. The old construction consisted of 9-in. grooved girder rail on untreated wood ties spaced at 2-ft. centers with bolted joints. It is estimated that this improvement will cost approximately $180,000.

Trade Notes

Winona Service Equipment Company, Indianapolis, Ind., has been incorporated to deal in rolling stock and equipment for street or interurban railroads. The directors are Harry Reid, J. F. Wild and Ira E. Guthrie. It has a capital of $30,000 common and $60,000 preferred stock.

Hynes & Cox Electric Corporation, Albany, N. Y., has been formed to enlarge and carry on the electrical heating business established by Lee P. Hynes. Mr. Hynes has not severed his connection with the Consolidated Car Heating Company and the new firm, although handling industrial work, will not deal in any materials which conflict with the work of the Consolidated Car Heating Company.

H. T. Heath has been appointed western department manager of the Hegeman-Castle Corporation of Chicago, owned and controlled by the National Railway Appliance Company of New York. Mr. Heath was at one time connected with the Westinghouse Electric & Manufacturing Company and later with the Economy Electric Devices Company.

Eisemann Magneto Corporation, New York, N. Y., announces that O. S. Stanley has been placed in charge of the middle Western territory, with headquarters at 2005 South Michigan Avenue, Chicago, vice P. G. Sedley, resigned. Irving W. Edwards has assumed the duties of district manager, with headquarters at 85 Second Street, San Francisco.

John F. Folkers Engineering Corporation, Mobile, Ala., has been appointed agent to handle sales and service for the Triumph Electric Company in the Mobile territory.

New Advertising Literature

Atlas Valve Company, Newark, N. J., has issued edition No. 1 of Bulletin 5-A, which is devoted entirely to its line of Victor damper regulators. The functions of damper regulators are listed under nine separate headings. Hydraulic operation as compared with other methods of operation is discussed. Diagrams show how to apply the regulators to boilers. A technical description is given with illustrations explaining in detail the method of operation of the high-pressure damper regulator.

Engineering Products Company, Chicago, Ill., has issued a new price list and descriptive circular covering its line of rail benders, track drills, gages and levels. Copies of this new list will be furnished on request.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 48,941A, entitled "CR-9006 Enameled Resistor Units," It is an 18-page illustrated booklet describing the uses and advantages of these units and giving standard ratings and dimensions.

Scovill Manufacturing Company, Waterbury, Conn., has issued "Brass Facts," a 28-page booklet dealing with the characteristics of copper alloys, especially brass. The book classifies and gives the chemical composition of the most popular brass mill alloys such as brass, bronze, nickel silver and cupro nickel. It tells in detail how brass and nickel silver are made free cutting. Annealing for degrees of softness of brass is gone into, with numerous illustrations, showing the microstructure of annealed as well as rolled brass. This booklet also contains a detailed description of the method of manufacture of cup drawn Admiralty and special Muntz Condenser tubing and seamless tubing.

The Universal Coal Spreader Company, Chicago, Ill., has issued a seven-page pamphlet entitled "The Universal Coal Spreader." The pamphlet describes, with illustrations, operation with and without the Universal coal spreader.